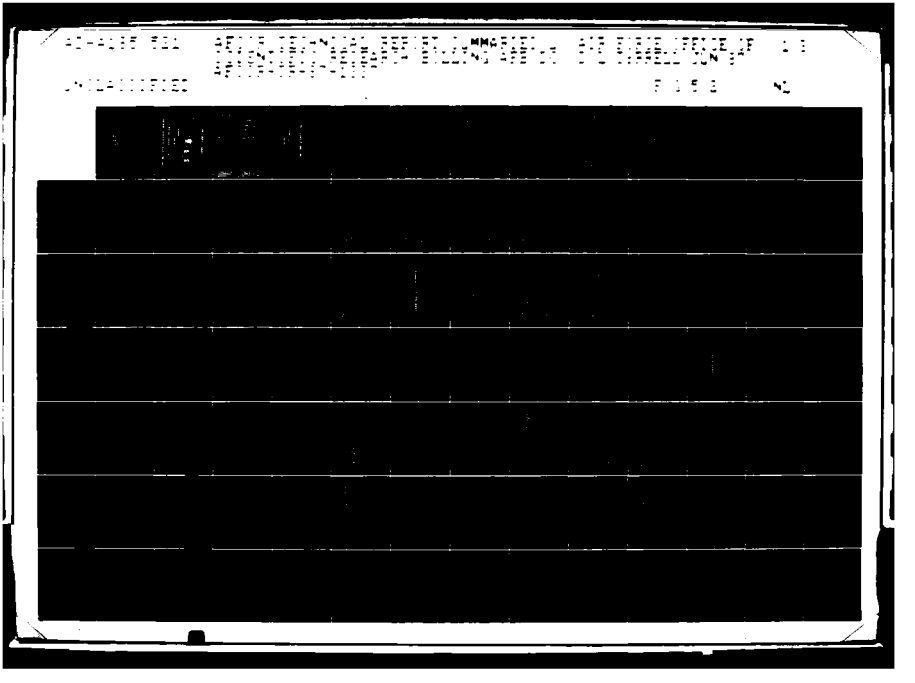

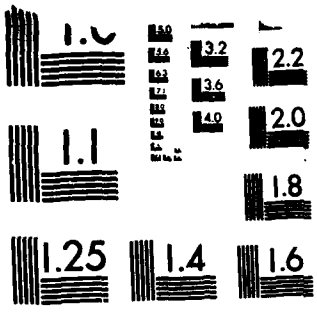

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Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

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Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

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AD-A174 921

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AD-A174 970

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AD-A174 921

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AD-C040 023

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AD-A174 429

ABSTRACTS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-C040 023 .9 3/0

SCHAFER (W J) ASSOCIATES INC ARLINGTON VA

(U) Short Wavelength Chemical Laser (SWCL) Technology.

DESCRIPTIVE NOTE: Final rept. Sep 84-Jul 86,

JUL 86 84P

PERSONAL AUTHORS: Watt,William S. ;Hart,George A. ;Zajac, Lawrence J. ;

REPORT NO. WJSA-86S-VA-132

CONTRACT NO. F49620-84-C-0104

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-86-1070

SECRET REPORT

DECLASS ON OADR

ABSTRACT: (U) This report documents Short Wavelength Chemical Laser (SWCL) activities performed for the Air Force Office of Scientific Research (AFOSR) and the Strategic Defense Initiative Organization (SDIO). These included the organization and planning of a SWCL workshop, comparative analysis of the chemical HF and oxygen/iodine lasers for specific applications, quantification of the critical kinetic pathways in the NF-IF transfer chemical laser and evaluation of novel SWCL concepts.

DESCRIPTORS: (U) *CHEMICAL LASERS, NITROGEN, FLUORIDES, IODINE, HYDROGEN FLUORIDE LASERS, OXYGEN, IODINE, MILITARY APPLICATIONS, AIR FORCE RESEARCH, KINETICS, ENERGY TRANSFER, SHORT WAVELENGTHS, LASER BEAMS, WORKSHOPS

IDENTIFIERS: (U) PE61102F, WY4UAFOSR2301A1

AD-C040 023

AD-B108 363 .18 4/0.20 8/0

RAYTHEON CO PORTSMOUTH RI SUBMARINE SIGNAL DIV

(U) Analytical/Experimental Investigation of Corpuscular Radiation Detectors.

DESCRIPTIVE NOTE: Annual rept. 15 Jun 85-15 Jun 86,

JUN 86 108P

PERSONAL AUTHORS: Grossi,Mario D. ;

REPORT NO. 94404

CONTRACT NO. F49620-85-C-0030

PROJECT NO. 5271

TASK NO. 00

MONITOR: AFOSR *TR-86-2099*

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies and their contractors; Critical Technology; 29 Dec 86. Other requests must be referred to AFOSR/XOTD, Bldg. 410, Bolling AFB, Washington, DC 22032-6448.

ABSTRACT: (U) The mechanical force sensing approach to low energy neutrino detection acquired an even greater emphasis because of the strong interest expressed by DARPA in performing a rigorous verification of Prof. Weber's claim that he has detected, at the U. of Maryland, low-energy antineutrinos, radiated by a 600 Curie tritium source, by using a room temperature torsion-balance. The engineering definition is made of a cryogenic force sensor that is expected to improve by several orders of magnitude on Prof. Weber torsion-balance's sensitivity. An area of concentration will be to identify causes, other than neutrino-induced effects, of the signal that might appear at the output of the sensors used in the tests. Some examples follow herewith. Several safeguards are planned concerning the isolation of the cryogenic force sensor against vibrations and acoustical oscillations. One is to construct the 4 k cryostat with an inner chamber evacuated of air. It is inside this chamber that the grazvity gradiometer is installed,

AD-B108 363

AD-B108 383 CONTINUED

hanging like a pendulum from a suspension at the top of the cryostat. The resonance frequency of the suspension will be as low as feasible, 0.1 Hz or lower, and provisions will be made to have the frequency of the signal as high as possible, possibly 100 Hz, by mechanically rotating the source. This way, the sensor will achieve a substantial attenuation of floor vibrations at the frequency of interest.

DESCRIPTORS: (U) *NEUTRINOS, *RADIATION MEASURING INSTRUMENTS, ACOUSTICS, ANTIPARTICLES, APPROACH, ATTENUATION, CHAMBERS, CORPUSCULAR RADIATION, CRYOGENICS, CRYOSTATS, DETECTION, FORCE(MECHANICS), FREQUENCY, GRADIOMETERS, ISOLATION, LOW ENERGY, OSCILLATION, OUTPUT, RESONANT FREQUENCY, SIGNALS, VIBRATION, TORSION BARS, SENSITIVITY, MOMENTUM TRANSFER, BALANCES

IDENTIFIERS: (U) Antinutrinos

AD-B107 962L .21 1/0.21 2/0.21 4/0

ATLANTIC RESEARCH CORP ALEXANDRIA VA

(U) A Finite-Rate-Kinetics Model for Formation of Liquid Boron Oxide in a Nozzle Expansion Processes.

DESCRIPTIVE NOTE: Rept. for 15 Jan 84-28 Feb 86,

OCT 86 20P

PERSONAL AUTHORS: King,Merrill K. ;

REPORT NO. 41-5160A

CONTRACT NO. F49620-85-C-0020, F33615-85-C-2538

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-86-2093

UNCLASSIFIED REPORT

Distribution limited to DoD and DoD contractors only; Critical Technology; Sep 86. Other requests must be referred to Air Force Systems Command, AFWAL/POPR. Wright-Patterson AFB, OH 45433.

ABSTRACT: (U) An analysis model of the formation of liquid boron oxide from B203 gas and various gaseous HOBO species (monomer, dimer, trimer) during expansion of a boron-loaded combustion product stream through a converging-diverging nozzle has been developed. Finite gas reaction kinetics, homogeneous nucleation, and deposition of gas molecules on homogeneous nuclei and heterogeneous seed particles (e.g. Mgo) for subsequent particle growth are treated. Several options for growth processes are examined. It is concluded that use of simple collision theory (collisions of gas molecules with droplets yielding condensation) without consideration of thermal accommodation effects (balancing of heat transfer rate from the droplets to the gas in which they are entrained against rate of deposition of latent heat into the droplets from condensation of gaseous molecules on them) leads to non-negligible errors in predicted condensation rates (overly high rates being predicted). Parametric studies indicate that use of seed particles at

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-B107 962L CONTINUED

practical levels and particle sizes is unlikely to dramatically improve condensation rates under realistic operating conditions. Increasing pressure or motor scale leads to limited improvements in condensation efficiency due to condensation-induced self-compensation effects.

DESCRIPTORS: (U) *COMBUSTION PRODUCTS, *REACTION KINETICS, *BORON OXIDES, BORON, COLLISIONS, CONDENSATION, CONVERGENT DIVERGENT NOZZLES, DEPOSITION, DROPS, EFFICIENCY, EXPANSION, GASES, GROWTH(GENERAL), HEAT TRANSFER, HIGH RATE, HOMOGENEITY, LATENT HEAT, LIQUIDS, MOLECULES, NUCLEATION, NUCLEI, PARAMETRIC ANALYSIS, PARTICLE SIZE, PARTICLES, RATES, THEORY, NOZZLE GAS FLOW, FUELS

IDENTIFIERS: (U) Boron hydroxides, WUAFOSR2308A1, PE61102F

AD-B107 755 .11 4/0.11 6/0.20 11/0

GRUMMAN CORP BETHPAGE NY CORPORATE RESEARCH CENTER

(U) Micro-Mechanisms of Deformation in SiC/Al Composites.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Aug 85-31 Jul 86,

JUL 86 19P

PERSONAL AUTHORS: Papazian,John M. ;Adler,Philip N. ;

REPORT NO. RE-724

CONTRACT NO. F49620-84-C-0055

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-86-2030

UNCLASSIFIED REPORT
EXPORT CONTROL

Distribution limited to U.S. Gov't. agencies and their contractors; Critical Technology; 29 Dec 86. Other requests must be referred to AFOSR/XOTD, Bldg. 410, Bolling AFB, DC 20332-6448. This document contains export-controlled technical data.

ABSTRACT: (U) The tensile stress-strain behavior of a series of discontinuously reinforced aluminum alloy composites containing 0, 8, and 20 volume percent SiC was examined. Comparisons were made between the behavior of age-hardenable (2124) vs solution-Hardened (5456) matrix alloys, whisker vs particulate forms of the SiC reinforcement, and various states of matrix precipitation. The elastic modulus and work-hardening rate of both matrix alloys increased systematically with the addition of SiC. In the solution-hardened alloy, the effects of whiskers were greater than those of particulate, while in the age-hardenable alloy, they were equivalent. In both alloys, the proportional limit of the 8% SiC composites was less than that of the unreinforced PM matrix. Increasing the SiC to 20% raised the proportional limit, but in 2124 the proportional limit of the 20% composites was still below that of the PM material. This reduction in proportional limit behavior was characteristic of all of the heat treatment conditions examined, with the

AD-B107 755 CONTINUED

exception of the T8 temper, which showed a monotonic increase in the proportional limit with increased SiC content. This phenomenon is thought to be caused by the presence of mobile dislocations generated by the thermal expansion mismatch between SiC content. This phenomenon is thought to be caused by the presence of mobile dislocations generated by the thermal expansion mismatch between SiC and aluminum. The state of matrix precipitation was found to have a pronounced effect on the mechanical properties of the composite. The proportional limit of the 20% SiC/2124 composite varied from 9 ksi in the annealed condition to 95 ksi in the T8.

DESCRIPTORS: (U) *ALUMINUM ALLOYS, *METAL MATRIX COMPOSITES, *SILICON CARBIDES, *AGE HARDENING, BEHAVIOR, COMPOSITE MATERIALS, DISLOCATIONS, HEAT TREATMENT, LIMITATIONS, MATRIX MATERIALS, MECHANICAL PROPERTIES, MOBILE, MODULUS OF ELASTICITY, REINFORCING MATERIALS, STRESS STRAIN RELATIONS, TENSILE PROPERTIES, THERMAL EXPANSION, WHISKER COMPOSITES

IDENTIFIERS: (U) Aluminum Alloy 2124, Aluminum Alloy 5456, WUAFOSR2306A1, PE61102F, Export Control

AD-A176 263

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) An Improved Algorithm for Performance Analysis of Networks with Unreliable Components,

86 4P

PERSONAL AUTHORS: Lam,Y. F. ;Li,Victor O. ;

CONTRACT NO. AFOSR-84-0269

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2142

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Communications, vCOM-34 n5 p496-497 May 86.

ABSTRACT: (U) A new approach for analyzing the performance of communication networks with unreliable components was given in a recent paper. An algorithms was developed to generate the most probable states of a network, and an analysis of those states gave a good approximation of the network performance. This reprint presents a new algorithm for generating the most probable states. This new algorithm is a major improvement over the previous one in terms of efficiency and flexibility.

DESCRIPTORS: (U) *NETWORK ANALYSIS(MANAGEMENT), *COMMUNICATIONS NETWORKS, ALGORITHMS, PARTS, PERFORMANCE TESTS, REPRINTS, RELIABILITY(ELECTRONICS)

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A176 193 .12 6/0

DUKE UNIV DURHAM NC

(U) On Modelling the Performance and Reliability of Multimode Computer Systems.

MAY 86 9P

PERSONAL AUTHORS: Kulkarni,V. G. ;Nicola,V. F. ;Trivedi,K. S. ;

CONTRACT NO. DAAG29-84-K-0045, AFOSR-84-0132

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR TR-86-2007

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Systems and Software, v6 n127 p175-182 May 86.

ABSTRACT: (U) This reprint presents an effective technique for the combined performance and reliability analysis of multimode computer systems. A reward rate (or a performance level) is associated with each mode of operation. The switching between different modes is characterized by a continuous-time Markov chain. Different types of service-interruption interactions (as a result of mode switching) are considered. The authors consider the execution time of a given job on such a system and derive the distribution of its completion time. A useful dual relationship, between the completion time of a given job and the accumulated reward up to a given time is noted the use of this technique is demonstrated by means of a simple example.

DESCRIPTORS: (U) *COMPUTERS, *MULTIMODE, OPERATION, REPRINTS, TIME, MATHEMATICAL MODELS, RELIABILITY(ELECTRONICS)

IDENTIFIERS: (U) PE6110F, WUAFOSR2304K3

AD-A176 193

AD-A176 187 .12 9/0

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF ELECTRICAL COMPUTER AND SYSTEMS ENGINEERING

(U) Simply Instrumentable and Optimal Digitization of Analog Information Sources .

DESCRIPTIVE NOTE: Final rept. 30 Jun 81-31 Dec 85,

MAY 86 34P

PERSONAL AUTHORS: Pearlman,William A. ;

CONTRACT NO. AFOSR-81-0188

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-0652

UNCLASSIFIED REPORT

ABSTRACT: (U) The research was to build on a theory of Finamore and Pearlman (1) stating that nearly optimal encoding of analog sources can be achieved with a small, finite reproduction alphabet, if that alphabet is selected properly. (Author)

DESCRIPTORS: (U) *CODING, ANALOG SYSTEMS, DIGITAL SYSTEMS, INFORMATION SYSTEMS, OPTIMIZATION, SOURCES, ALPHABETS, REPRODUCTION, IMAGE PROCESSING

IDENTIFIERS: (U) Speech processing, PE61102F, WUAFOSR2304A5

AD-A176 187

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A176 162 .6 4/0

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF PSYCHOLOGY

(U) Eye Movements and Visual Information Processing.

DESCRIPTIVE NOTE: Final rept. 1 Jan 81-30 Jun 84,

MAY 86 9P

PERSONAL AUTHORS: Kowler,Eileen ;

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-86-0513

UNCLASSIFIED REPORT

ABSTRACT: (U) Completed studies showed that: 1) saccade-like stimulus transients (abrupt onsets or off-sets) do not aid visual search; 2) anticipatory smooth eye movements depend in a lawful way on the stimuli in prior trials; 3) smooth pursuit eye movements are determined by two, independent processes; 4) reading efficiency is not limited by the pattern of eye movements, but rather by the ability to recognize words quickly; 5) subjects can maintain the line of sight on one of two, superimposed, full-field, patterns of randomly positioned dots -- one pattern moving and the other stationary.

DESCRIPTORS: (U) *VISUAL PERCEPTION, *EYE MOVEMENTS, EFFICIENCY, EYE MOVEMENTS, LINE OF SIGHT, PATTERNS, READING, SEARCHING, STIMULI, VISUAL SIGNALS, INFORMATION PROCESSING

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5

AD-A176 162

AD-A176 123 .20 12/0

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Investigation of Defect and Electronic Interactions Associated with GaAs Device Processing.

DESCRIPTIVE NOTE: Final rept. 15 Aug 85-14 Aug 86,

SEP 86 55P

PERSONAL AUTHORS: Gatos,Harry C. ;Lagowski,Jacek ;

CONTRACT NO. F49620-83-C-0139

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR TR-86-1083

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigation of defects in Gallium Arsenide is persued along three lines especially important for device processing: (a) origin and control of native midgap levels; (b) the role of vanadium in achieving semi-insulating GaAs; and (c) feasibility of achieving titanium doped semi-insulating III-v crystals. By employing high resolution optical absorption and DLTS measurements, we obtained an accurate calibration for the determination of EL2 by optical absorption. The new revised calibration factor is about 40% larger than the commonly used value. Vanadium in GaAs introduces only an acceptor level at (E sub c) -0.15 eV. Accordingly, the vanadium level cannot be involved in compensation mechanism responsible for semi-insulating GaAs. However, vanadium can help to achieve SI material due to its active role as a gettering center reducing concentration of Si. A search for an impurity with a midgap donor level has led to the discovery of new semi-insulating III-V compounds based on titanium doping. For the first time deep levels are identical due to titanium in GaAs and InP, and the midgap location (E sub c) -0.63 eV) of the Ti donor in InP can be used to obtain SI-InP with a resistivity exceeding -10 million ohm-cm.

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *GROUP III

AD-A176 123

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A176 123 CONTINUED

COMPOUNDS, *GROUP V COMPOUNDS, *VANADIUM, ELECTRON ACCEPTORS, CALIBRATION, ELECTRONICS, INTERACTIONS, INSULATION, ELECTRICAL RESISTANCE, COMPENSATION, PROCESSING, ABSORPTION, HIGH RESOLUTION, OPTICAL PROPERTIES, TITANIUM, DOPING

AD-A175 904 .20 4/0.20 11/0.21 5/0

PURDUE UNIV LAFAYETTE IN SCHOOL OF MECHANICAL ENGINEERING

(U) Research on Aero-Thermodynamic Distortion Induced Structural Dynamic Response of Multi-Stage Compressor Blading.

DESCRIPTIVE NOTE: Annual summary rept. 16 May 85-15 Jun 86,

AUG 86 114P

PERSONAL AUTHORS: Fleeter,Sanford ;

REPORT NO. ME-TSPC-TR-86-11

CONTRACT NO. F49620-83-K-0029

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-86-2113

UNCLASSIFIED REPORT

ABSTRACT: (U) The structural dynamic response of turbomachinery components to aerothermodynamic distortion induced excitations is of major concern in the design of advanced gas turbine engines. Rotor speeds at which these resonant forced responses occur can be predicted with Campbell diagrams. However, due to inadequacies of existing time-variant aerodynamic models, no accurate prediction can be made for the amplitude of the resulting vibrations and stresses. Therefore, this research program seeks to quantitatively investigate the fundamental phenomena relevant to aero thermodynamic distortion induced structural dynamic blade responses in multi-stage gas-turbine engine components. Flow physics of multi-stage blade row interactions is being experimentally investigated, with unique unsteady aerodynamic data obtained to understand, quantify, and discriminate the fundamental flow phenomena as well as to direct the modeling of advanced analyses. Data are being obtained to define both the potential and viscous flow interactions and the effect on the aerodynamic forcing function and the resulting unsteady aerodynamics of both rotor blades

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 904 CONTINUED

and stator vanes. Analytically, a first principles capability to predict the vibrational response of blading due to aerodynamic excitations is being developed. Unsteady viscous flow analyses, appropriate for aerodynamic forced response predictions, are also being developed. Recent progress includes: stationary vane row experiments in a research compressor which investigate the fundamental multi-stage blade row interaction aerodynamics; and identification and modeling of a vortex street in the instantaneous wakes of rotor blades.

DESCRIPTORS: (U) *VIBRATION, *COMPRESSOR BLADES, AERODYNAMIC CHARACTERISTICS, AERODYNAMICS, BLADES, COMPRESSORS, DYNAMIC RESPONSE, ENGINES, FLOW, GAS TURBINES, GUIDE VANES, INTERACTIONS, MODELS, PARTS, PREDICTIONS, RATES, RESONANCE, RESPONSE, ROTOR BLADES, ROTORS, STATORS, STRESSES, STRUCTURAL RESPONSE, TIME, TURBOMACHINERY, UNSTEADY FLOW, VARIATIONS, VISCOUS FLOW, WAKE, DISTORTION, AEROTHERMODYNAMICS, RESONANT FREQUENCY, TURBINE COMPONENTS, VORTICES, AERODYNAMIC FORCES, EXCITATION

IDENTIFIERS: (U) Multistage Compressors, Vortex Streets, Aerothermodynamic Distortion, PE61102F, WUAFOSR2307A4

AD-A175 376 .12 3/0.13 8/0

CALIFORNIA UNIV DAVIS INTERCOLLEGE DIV OF STATISTICS

(U) Reliability Modeling and Inference for Coherent Systems Subject to Aging Shock and Repair.

DESCRIPTIVE NOTE: *Annual rept. 1 Jul 85-30 Jun 86,*

AUG 86 7P

PERSONAL AUTHORS: Samaniego,F. J. ;

CONTRACT NO. AFOSR-84-0159

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR TR-86-2194

UNCLASSIFIED REPORT

ABSTRACT: (U) Abstracts are provided for six reports, topics include: Estimating population characteristics from record-breaking observations; Estimating a distribution function based on nomination sampling; Estimating component reliability for systems with random redundancy levels; Some multivariate lifetime distributions; Estimating the reliability of systems subject to imperfect repair; Consistent estimation of a survival curve when new is better than used in expectation.

DESCRIPTORS: (U) *RELIABILITY, AGING(MATERIALS), SHOCK, CONSISTENCY, ESTIMATES, DISTRIBUTION, MULTIVARIATE ANALYSIS, REPAIR, GRAPHS, SURVIVAL(GENERAL), COHERENCE, DISTRIBUTION FUNCTIONS, REDUNDANCY, MODELS, RELIABILITY, SAMPLING, MATHEMATICAL MODELS, ABSTRACTS, STATISTICAL ANALYSIS, STATISTICAL DISTRIBUTIONS

IDENTIFIERS: (U) WUAFOSR2304K3, PE61103F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 285 .20 4/0

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Studies of Shear Flows.

DESCRIPTIVE NOTE: Final rept. Jan 84-Dec 85,

MAR 86 25P

PERSONAL AUTHORS: Kline,S. J. ;Johnston,J. P. ;Moffat,R. J. ;

CONTRACT NO. F49620-84-K-0004

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-86-2208

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the work reported is construction of zonal models for accurate prediction of turbulent flows in rapid-running computer programs. The work follows the ideas set down in the discussion of zonal modeling by S. J. Kline in Vol. II of the Proceedings of the 1980-81 AFOSR-Stanford Conference on Complex Turbulent Flows. This discussion noted that the fast-running models available lack sufficient span to predict all classes of turbulent flows of engineering importance in a standard, invariant form. It therefore suggested that the models be treated as zonal. In the zonal approach, the constants in th models are adjusted for each important zone of the flow, where the word zone implies a region with a particular type of flow physics. In the proposal for the work, it was also noted that the parametrization of the flows and the selection of appropriate constants would ultimately need to be guided by the domain over which accurate results could be obtained, and that might well be different from pre-conceptions embodied in conventional taxonomies of the flows.

DESCRIPTORS: (U) *TURBULENT FLOW, COMPUTER PROGRAMS, MATHEMATICAL MODELS, BOUNDARY LAYER FLOW, JET FLOW, WAKE, TURBULENT BOUNDARY LAYER, FLOW SEPARATION, MATHEMATICAL PREDICTION, TAXONOMY, PREDICTIONS, ENGINEERING, FLOW,

AD-A175 285 CONTINUED

CONSTRUCTION, MODELS, SHEAR PROPERTIES, PHYSICS

IDENTIFIERS: (U) *Shear flow, Zonal modeling

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A175 284 .12 3/0

COLORADO STATE UNIV FORT COLLINS

(U) Multivariable Problems of Statistical and Probability Theory.

DESCRIPTIVE NOTE: Annual rept. Apr 83-Apr 84,

APR 84 6P

PERSONAL AUTHORS: Srivastava,Jaya ;

REPORT NO. 03-2516

CONTRACT NO. AFOSR-83-0080

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2195

UNCLASSIFIED REPORT

ABSTRACT: (U) The author had three papers published, and three accepted for publication. Important advancement was made in the foundations of design theory. Difficult work (using ideal theory) was done on information matrices. The (very significant) paper on Parallel Flats Designs was revised, and so was another important paper on search decision rules. Work was also done in reliability and other fields. Keywords: Search linear models; Decision rule; Sensitivity revealing power; Coverings of affine spaces. (Author)

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, THEORY, RELIABILITY, LINEARITY, MATHEMATICAL MODELS, DECISION THEORY, SEARCHING

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A175 249 .12 5/0

STANFORD UNIV CA DEPT OF COMPUTER SCIENCE

(U) A Deductive Approach to Computer Programming.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-30 Sep 85,

86 110P

PERSONAL AUTHORS: Manna,Zohar ;

CONTRACT NO. AFOSR-81-0014

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-86-2164

UNCLASSIFIED REPORT

ABSTRACT: (U) This document consists of three reports: 1) TABLOG - The Deductive Tableau Programming Language; 2) The Origin of the Binary Search Paradigm; and 3) Special Relations in Automated Deduction.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, APPROACH, SEARCHING, ALGORITHMS, COMPUTER LOGIC, DERIVATIVES(MATHEMATICS)

IDENTIFIERS: (U) TABLOG Programming Language, TABLOG(Tableau Logic Programming Lanuage), Deduction, PE61102F, WUAFOSR2304A2

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 207 .1 3/3.20 4/0

FLOW RESEARCH CO KENT WA

(U) Development of a Device for Controlling the Leading Edge Vortices on a Delta Wing.

DESCRIPTIVE NOTE: Final rept. 1 Jul-31 Dec 85,

JAN 86 86P

PERSONAL AUTHORS: Gad-el-Hak,Mohamed ;

REPORT NO. FLOW-RR-357

CONTRACT NO. F49620-85-C-0131

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-86-2128

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent experimental observations have shown that a leading edge vortex on a delta wing at constant angle of attack consists of a series of discrete smaller vortices. These vortices pair, much the same as in a free shear layer. A device is proposed to modulate the shedding and the pairing of the discrete vortices by mechanically or acoustically perturbing the leading edge of a delta wing. By applying the perturbation to both leading edges, the total lift of a wing will be altered; alternatively, by using the perturbation preferentially on only one side of the wing, the rolling moment around the axis of symmetry of the aircraft is controlled. The proposed device will enable the pilot of a fighter aircraft to achieve a previously unattained degree of maneuverability. During the first phase of this research, experiments were conducted in both a water towing tank and a high speed wind tunnel. Flow visualization, fast-response velocity probe surveys, as well as force measurements were conducted to assess the performance of the proposed vortex control device and, more importantly at this early stage of the research, to understand the complex flow field under consideration. Keywords: Vortex control device; Lift control; Lift enhancement; Super-maneuverability.

AD-A175 207

AD-A175 207 CONTINUED

DESCRIPTORS: (U) *DELTA WINGS, *LEADING EDGES, *VORTICES, AIRCRAFT, ANGLES, PROBES, QUICK REACTION, SURVEYS, VELOCITY, FLOW VISUALIZATION, FLOW FIELDS, MANEUVERABILITY, FIGHTER AIRCRAFT, FORCE(MECHANICS), MEASUREMENT, VORTEX SHEDDING, PERTURBATIONS, BOUNDARY LAYER CONTROL, FLIGHT MANEUVERS, AERODYNAMIC FORCES, AERODYNAMIC CONTROL SURFACES, SHEAR PROPERTIES, LEADING EDGES, LIFT, OPTIMIZATION, CONTROL SYSTEMS, MODEL BASINS, WATER TANKS, HIGH VELOCITY, WIND TUNNELS, CONTROL, LIFT, MOMENTS, ROLL, WINGS

IDENTIFIERS: (U) *Vortex control, Lift control, Supermaneuverability, PE61102F, WUAFOSR3005A1

AD-A175 207

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 195 .20 4/0

HOKENSON (GUSTAVE J) LOS ANGELES CA

(U) Coherent Structure-Reflective Turbulent Viscous Flow Modeling.

DESCRIPTIVE NOTE: Annual rept. Mar 85-Mar 86,

MAY 86 38P

PERSONAL AUTHORS: Hokenson,Gustave J. ;

REPORT NO. HOKE-86-AF-02

CONTRACT NO. F49620-85-C-0075

MONITOR: AFOSR
TR-86-2106

UNCLASSIFIED REPORT

ABSTRACT: (U) By using a multiple-element scale/ coherence decomposition of the Navier-Stoke equations, the essential characteristics of the large scale turbulent structure are computed in wall-bounded shear flows. The effect of small-scale turbulence structure is modeled and the large-scale turbulence structure is computed assuming weakly non-linear large-scale dynamics. The effects of large-scale non-linearity and the presence of wave-like elements in the flow are accounted for using perturbation theory. The resultant propagation, evolution (in the convected reference frame) and (statistical) occurrence of three-dimensional vortical instabilities are computed and compared to experimental data. Coherent structure reflective turbulence models will be constructed from this analysis.

DESCRIPTORS: (U) *TURBULENT FLOW, *VISCOUS FLOW, VARIABLE PRESSURE, SCALING FACTORS, NAVIER STOKES EQUATIONS, COHERENCE, MATHEMATICAL MODELS, DECOMPOSITION, SHEAR PROPERTIES, WALLS, VORTICES, THREE DIMENSIONAL FLOW, FLUID DYNAMICS, NONLINEAR SYSTEMS, DYNAMICS, WAVES, STRUCTURAL PROPERTIES, TURBULENCE, PERTURBATION THEORY

AD-A175 195

AD-A175 194 .20 4/0

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Coherent Structure Modeling of Viscous Sublayer Turbulence for Incompressible Flow with Heat Transfer.

DESCRIPTIVE NOTE: Final rept.,

MAY 86 149P

PERSONAL AUTHORS: Ota,Dale K. ;Chapman,Dean R. ;

REPORT NO. SUDAA-CFD-85-2

CONTRACT NO. AFOSR-82-0083

PROJECT NO. 2703

TASK NO. A2

MONITOR: AFOSR
TR-86-2104

UNCLASSIFIED REPORT

ABSTRACT: (U) A Navier-Stokes computational model of the time-developement dynamics and heat transfer in a viscous sublayer had been developed. The main research objective is to determine the variation of turbulent Prandtl number across the sublayer. Experiments have been unable to define this variation, and existing theories differ greatly. The computational code uses prescribed temperature and velocity boundary conditions at the outer edge of the sublayer. Numerical computations of turbulent Prandtl number have been made for molecular Prandtl numbers ranging from 0.7 to 8 with zero pressure gradient, and for adverse, zero, and favorable pressure gradient with a Prandtl number of 0.7. The results show a strong effect of molecular Prandtl number on turbulent Prandtl number a very near the wall; but only a relatively small effect of pressure gradient throughout the sublayer. For most practical computations of heat transfer, the simple assumption of the constant turbulent Prandtl number across the viscous sublayer appears adequate. Keywords: Fluid mechanics; Viscous sublayer; Navier-Stokes equation; Computational model.

DESCRIPTORS: (U) *INCOMPRESSIBLE FLOW, *PRANDTL NUMBER, *HEAT TRANSFER, COHERENCE, MODELS, STRUCTURAL PROPERTIES,

AD-A175 194

AD-A175 194 CONTINUED

COMPUTATIONS, MATHEMATICAL MODELS, TURBULENCE, MOLECULES, NAVIER STOKES EQUATIONS, CODING, FLUID MECHANICS, NUMERICAL ANALYSIS, EDGES, EXTERNAL, PRESSURE GRADIENTS, BOUNDARIES, VELOCITY, SUBSURFACE, VISCOSITY, TEMPERATURE

IDENTIFIERS: (U) PE61102F

AD-A175 132 .20 5/0

NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) The Role of Surface Defects in Aluminum, Surface Oxidation,

JUN 86 3P

PERSONAL AUTHORS: Testoni,A. L. ;Stair,P. C. ;

CONTRACT NO. AFOSR-83-0302

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-86-2153

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Vacuum Science and Technology A, v4 n3 p1430-1431 May/Jun 86.

ABSTRACT: (U) The detailed Al (111) surface structure depends upon the surface preparation. Steps, mosaics, and facets can form depending upon the sputtering time and the duration and temperature of annealing. In turn, the oxidation threshold of the surface depends upon the type and concentration of surface defects, with steps being the most important. Low energy electron diffraction (LEED) and Auger electron spectroscopy (AES) measurements of oxidation kinetics were made for several Al (111) surfaces to demonstrate the relationship between microscopic surface structure an surface oxidation. (Reprints).

DESCRIPTORS: (U) *ALUMINUM, *OXIDATION, *DEFECTS(MATERIALS), ELECTRON DIFFRACTION, LOW ENERGY, KINETICS, REPRINTS, SPUTTERING, PREPARATION, SURFACES, ANNEALING, TEMPERATURE, AUGER ELECTRON SPECTROSCOPY, MICROSCOPY, STRUCTURES, OXIDATION, THRESHOLD EFFECTS, SURFACES, OXIDATION, SURFACES, STRUCTURAL PROPERTIES, REACTION KINETICS, SURFACE CHEMISTRY

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A175 131 .20 5/0

NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) The Effects of Surface Facets on the Oxidation of Aluminum (111) Surfaces.

86 9P

PERSONAL AUTHORS: Testoni,A. L. ;Stair,P. C. ;

CONTRACT NO. AFOSR-83-0302, NSF-DMR82-16972

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-86-2152

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v171 pL491-L497 1986.

ABSTRACT: (U) The initial oxidation of planar and facetted aluminum (111) surfaces was studied with low energy electron diffraction (LEED) and Auger electron spectroscopy (AES). The facetted surface was produced by rapidly heating the planar (111) surface to 773 K, and consisted of (111) and (221) planes. The planar surface showed first oxide-like aluminum at 50 L; however, the facetted surface showed first oxide at less than 10 L. The results are discussed in terms of the facet plane structures. (Reprints).

DESCRIPTORS: (U) *SURFACE CHEMISTRY, *ALUMINUM, *OXIDATION, AUGER ELECTRON SPECTROSCOPY, OXIDES, OXIDATION, PLANAR STRUCTURES, SURFACES, REPRINTS, SURFACES, ELECTRON DIFFRACTION, LOW ENERGY, PLANAR STRUCTURES, CRYSTAL STRUCTURE

IDENTIFIERS: (U) LEED(Low Energy Electron Diffraction), PE61102F, WUAFOSR2303A2

AD-A175 121 .12 1/0.12 6/0

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Sparse Elimination on Vector Multiprocessors.

DESCRIPTIVE NOTE: Interim rept. 1 May 85-30 Apr 86,

APR 86 7P

PERSONAL AUTHORS: Calahan,D. A. ;

CONTRACT NO. AFOSR-84-0096

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-86-2184

UNCLASSIFIED REPORT

ABSTRACT: (U) The availability of instruction-level simulators for the CRAY X-MP and the CRAY-2, together with early access to the MFECC and NAS CRAY-2's, has made possible the study of a variety of equation-solving issues for many-processor VMP configurations. These include: (1) the development of equation-solving algorithms on the CRAY-2, and; (2) task granularity studies; and (3) memory conflict studies.

DESCRIPTORS: (U) *SPARSE MATRIX, *MULTIPROCESSORS, ACCESS, CONFLICT, ELIMINATION, MEMORY(PSYCHOLOGY), VECTOR ANALYSIS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 113 .6 4/0

NEW HAMPSHIRE UNIV DURHAM VISION RESEARCH LAB

(U) Spatial and Temporal Visual Masking and Visibility.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 84-31 Mar 86,

JUN 86 60P

PERSONAL AUTHORS: Smith,Robert A. ;

CONTRACT NO. AFOSR-84-0348

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-2155

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies continue on spatio-temporal interactions between briefly-flashed lines. The delayed facilitation we previously reported suggested that we were tapping a motion-detector system. However extensive experiments which failed to correlate our line interactions with the motion aftereffect and other well-known manifestations of motion detection have convinced us that we are measuring something different. We currently believe we may be tapping the moving-object detectors described by Burr. We have demonstrated that transient stimulation produces a substantial change in the configuration of inhibition and excitation, as revealed by summation between briefly-flashed lines. We have extended our studies of summation between lines to parafoveal vision. Unlike most visual functions, spatial summation in the periphery does not increase in direct proportion to cortical magnification. Based on our studies of summation, we predicted and observed that aliasing, though absent in the fovea, should be present in the parafovea. Studies of velocity discrimination suggest that there do not exist a small numer of discrete velocity detectors, but rather a near-continuum of theses. Keywords: Visual targets; Moving targets; Visual perception.

DESCRIPTORS: (U) *VISUAL ACUITY, CONFIGURATIONS, DETECTION, DISCRIMINATION, FOVEA, INHIBITION,

AD-A175 113 CONTINUED

INTERACTIONS, MAGNIFICATION, MASKING, MOTION, MOVING TARGETS, STIMULATION(GENERAL), TRANSIENTS, VELOCITY, VISIBILITY, VISION, VISUAL PERCEPTION, VISUAL TARGETS

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5

AD-A175 113

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A175 104 .6 11/0.21 4/0

ILLINOIS UNIV AT URBANA DEPT OF VETERINARY BIOSCIENCES

(U) A Comparative Study Regarding the Association of Alpha-2U Globulin with the Nephrotoxic Mechanism of Certain Petroleum-Based Air Force Fuels.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 86,

OCT 86 19P

PERSONAL AUTHORS: Eurell,Thomas E. ;

CONTRACT NO. AFOSR-84-0283

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-86-2177

UNCLASSIFIED REPORT

ABSTRACT: (U) Fischer 344 male rats have a dose and time dependent proximal tubular degeneration induced by certain petroleum-based fuels. This degeneration may be associated with a low molecular weight alpha globulin (termed alpha-2U globulin). A new method was developed to obtain monospecific immunologic reagents for alpha-2U globulin using diafiltration, anion-exchange and hydroxylapatite chromatography. Rocket immunoelectrophoretic and isoelectric focusing techniques were developed to quantitatively and qualitatively assess changes in alpha-2U globulin after experimental exposure to hydrocarbon compounds. Keywords: Nephrotoxicity; Alpha-2u globulin; Rat urinary protein; Petroleum products.

DESCRIPTORS: (U) *TOXIC HAZARDS, *KIDNEYS, *BIODETERIORATION, HYDROCARBONS, TOXICITY, AIR FORCE, FUELS, PETROLEUM PRODUCTS, PROTEINS, RATS, URINE, CHEMICAL AGENTS, IMMUNOLOGY, TUBULAR STRUCTURES, EXPOSURE(PHYSIOLOGY), GLOBULINS, DOSE RATE, TIME DEPENDENCE, TUBES, FILTRATION, ION EXCHANGE, CHROMATOGRAPHY, ELECTROPHORESIS

IDENTIFIERS: (U) Nephrotoxicity, Kidney tubular degeneration, Diafiltration, Alpha-2u globulin, PE61102F, WUAFOSR2312A5

AD-A175 104

AD-A175 090 .20 4/0.20 11/0.21 5/0

PURDUE UNIV LAFAYETTE IN SCHOOL OF MECHANICAL ENGINEERING

(U) Research on Aero-Thermodynamic Distortion Induced Structural Dynamic Response of Multi-Stage Compressor Blading.

DESCRIPTIVE NOTE: Annual summary rept. 16 Apr 84-15 May 85,

JUL 85 46P

PERSONAL AUTHORS: Fleeter,Sanford ;

REPORT NO. ME-TSPC-TR-85-10

CONTRACT NO. F49620-83-K-0029

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-86-2163

UNCLASSIFIED REPORT

ABSTRACT: (U) The flow physics of multi-stage blade row interactions is being investigated. Unique data are being obtained to define the potential and viscous flow interactions and the effect on the aerodynamic forcing function and the unsteady aerodynamics of both rotors and stators. Analytically, a first principles capability to predict the vibrational response of blading is being developed. Also, unsteady viscous flow analyses for aerodynamic forcing response predictions are being developed. Progress during this reporting period include: vane row experiments which investigate fundamental blade row aerodynamics interactions; the identification and modeling of a vortex street structure in the instantaneous rotor wakes; preparations for rotating blade row experiments; the developement and application of a locally analytic numerical method for steady viscous flows; the formulation of an unsteady incompressible viscous thin airfoil theory. Keywords: Unsteady aerodynamics, Aeroelasticity, Forced vibrations, Gas turbines, Turbomachinery.

AD-A175 090

AD-A175 090 CONTINUED

DESCRIPTORS: (U) *AEROTHERMODYNAMICS, *DISTORTION, *COMPRESSOR BLADES, *VIBRATION, AIRFOILS, STRUCTURAL RESPONSE, DYNAMIC RESPONSE, POTENTIAL FLOW, COMPRESSOR ROTORS, COMPRESSOR STATORS, VORTICES, AEROELASTICITY, AERODYNAMICS, BLADES, INTERACTIONS, WAKE, BLADES, ROTATION, TURBOMACHINERY, RESPONSE, MATHEMATICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, PHYSICS, GAS TURBINES, PREDICTIONS, STEADY FLOW, VISCOUS FLOW, AERODYNAMIC CHARACTERISTICS, UNSTEADY FLOW, INTERACTIONS

IDENTIFIERS: (U) Multistage compression blades, Forcing functions, Vortex streets. WUAFOSR2307A4, PE61102F

AD-A175 082 .12 3/0.12 9/0

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCES

(U) Calculation of Cumulative Distributions and Detection Probabilities in Communications and Optics.

DESCRIPTIVE NOTE: Final rept. 1982-1986,

MAR 86 133P

PERSONAL AUTHORS: Helstrom,Carl W. ;

CONTRACT NO. AFOSR-82-0343

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2183

UNCLASSIFIED REPORT

ABSTRACT: (U) This report treats the numerical computation of cumulative distributions of random variables occurring primarily in communications, radar, and optics when their moment-generating or probability-generating functions are known. The cumulative distribution of a continuous random variable is expressed as a Laplace inversion integral of its moment-generating function, that of an integer-valued random variable as a contour integral that arises from Cauchy's theorem and whose integrand involves the probability-generating function. These integrals are evaluated by numerical quadrature along contours in the complex plane chosen for efficiency and convenience. Applications include radar detection probabilities with fading and unfading signals and fixed-threshold and constant-false-alarm-rate receivers; the distributions of the integrated output of a linear rectifier and of the filtered output of a qadratic rectifier; the error probability in a binary symmetric communication channel with intersymbol and cochannel interference; the distribution of shot noise; the distributions of the numbers of electrons emerging from photoelectric detectors, photomultipliers, and avalanche diodes; and significance probabilities in statistical rank tests.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 082 CONTINUED

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS, *DETECTION, *ELECTRONS, *RECTIFIERS, *NUMERICAL METHODS AND PROCEDURES, *RANK ORDER STATISTICS, AVALANCHE DIODES, FILTERS, OUTPUT, INTEGRATED SYSTEMS, CHANNELS, CONTOURS, INTEGRALS, DISTRIBUTION, SHOT NOISE, ERRORS, PROBABILITY, LINEARITY, COMPUTATIONS, PHOTOELECTRICITY, DETECTORS, RADAR, RANDOM VARIABLES, OPTICS, PHOTOMULTIPLIER TUBES, STATISTICAL TESTS

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A175 081 .12 3/0

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Analysis of an Identification Algorithm Arising in the Adaptive Estimation of Markov Chains,

DEC 85 5P

PERSONAL AUTHORS: Arapostathis,Aristotle ;Marcus,Steven I. ;

CONTRACT NO. F49620-82-C-0033, AFOSR-84-0089

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-86-2174

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference on Decision and Control (24th), p208-211 Dec 85.

ABSTRACT: (U) There has recently been significant progress in various aspects of stochastive adaptive control. However, there are some deficiencies in this theory: (a) in all but the case of linear systems, the parameters estimates consists of minimum contrast or maximum likelihood estimates, or some modification of these, which are not necessarily easily computable in a recursive manner; (b) aside from the case of linear systems, virtually all of the work to date has involved complete (noise-less) state observations. This paper, begins to address (a) and (b) above by studying adaptive problems with incomplete state information, in which the state is a finite state Markov process. First consider the problem of adaptive state estimation, which is important both in its own right and in the context of adaptive stochastic control. Interesting results exist for linear discrete time and continuous time systems. (Reprints).

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *STOCHASTIC CONTROL, *MARKOV PROCESSES, ADAPTIVE SYSTEMS, TIME, MAXIMUM LIKELIHOOD ESTIMATION, LINEAR SYSTEMS, IDENTIFICATION, REPRINTS

AD-A175 082

AD-A175 081

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 081 CONTINUED

IDENTIFIERS: (U) *Markov chains, WUAFOSR2304A1, PE61102F

AD-A175 080 .12 1/0.12 9/0

BROWN UNIV PROVIDENCE RI

(U) Feedback Stabilization of State Delayed Systems via a Reducing Transformation,

DEC 85 3P

PERSONAL AUTHORS: Fiagbedzi,Y. A. ;Pearson,A. E. ;

CONTRACT NO. AFOSR-85-0300, NSF-ECS81-11219

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-86-2172

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Conference on Decision and Control (24th), p128-129 Dec 85.

ABSTRACT: (U) A reducing transformation is devised for class of state delayed differential systems. The reduced system facilitates the design of feedback stabilizing controls based on delay free control techniques. (Reprints).

DESCRIPTORS: (U) *CONTROL, *FEEDBACK, *STABILIZATION, DELAY, REPRINTS, REDUCTION

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 076 .12 5/0.12 8/0

NORTH CAROLINA STATE UNIV AT RALEIGH

(U) Fast Algorithms for Structural Analysis, Least Squares and Related Computations.

DESCRIPTIVE NOTE: Annual interim rept. 15 Jul 85-14 Jul 86,

AUG 86 10P

PERSONAL AUTHORS: Plemmons,Robert J. ;

CONTRACT NO. AFOSR-83-0255

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-86-2131

UNCLASSIFIED REPORT

ABSTRACT: (U) New fast algorithms for high speed computation on the modern generation of supercomputers is essential. To meet these challenges new techniques are developed in numerical linear algebra and its applications for implementation on these new architectures. Significantly, applications of this work to practical problems of structural analysis and design and to least squares adjustments, estimation and digital filtering are also being investigated. The current objectives in structural analysis are to develop efficient and stable high speed algorithms for the design and analysis of large complex systems. Interest here is in developing stable alternatives to the often ill conditioned stiffness matrix approach to solving problems in elastic analysis and structural dynamics. For example, a comparative study is developed of the performances of seven alternative methods to the stiffness approach on the Alliant FX/8 and Cray X-MP systems. These methods involve various orthogonal factorization approaches as well as preconditioned conjugate gradient methods which completely avoid formation of the stiffness equations.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *ALGORITHMS, *COMPUTER ARCHITECTURE, COMPUTATIONS, ELASTIC PROPERTIES, HIGH RATE, LINEAR ALGEBRA, NUMERICAL ANALYSIS, PROBLEM

AD-A175 076

AD-A175 076 CONTINUED

SOLVING, APPROACH, STIFFNESS, DIGITAL FILTERS, LEAST SQUARES METHOD, STRUCTURAL ANALYSIS, STABILITY, EQUATIONS, DATA RATE, PARALLEL PROCESSING, SUPERCOMPUTERS

IDENTIFIERS: (U) CRAY X-MP computers, CRAY 2 computers, ALLIANT FX/8 computers, Conjugate gradient method, WUAFOSR2304A8, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 075 .12 2/0.25 3/0

CLEMSON UNIV SC

(U) Algebraic and Computational Aspects of Network Reliability and Problems.

DESCRIPTIVE NOTE: Annual rept. 15 Jun 85-14 Jun 86,

JUL 86 5P

PERSONAL AUTHORS: Shier,Douglas ;

CONTRACT NO. AFOSR-84-0154

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR TR-86-2115

UNCLASSIFIED REPORT

ABSTRACT: (U) It is important to be able to assess the reliability of a complex system in terms of the reliabilities of its components. This type of problem arises with increasing frequency in the analysis of telecommunication and distribution systems, which can be represented as networks. The present research employs an underlying algebraic structure to study network reliability problems and to develop new algorithms for their solution. Iterative techniques for calculating reliability (both exactly and approximately) have been developed for both general networks and a difficult class of specialized networks. These techniques allow the solution of fairly complex networks, ones that have previously resisted analysis. In addition, the underlying structure of network reliability problems has been approached by studying the combinatorial properties of a certain polynomial defined with respect to the underlying graph topology.

DESCRIPTORS: (U) *ALGEBRA, *NETWORK ANALYSIS(MANAGEMENT), RELIABILITY(ELECTRONICS), ALGORITHMS, COMBINATORIAL ANALYSIS, GRAPHS, ITERATIONS, NETWORKS, POLYNOMIALS, TELECOMMUNICATIONS, TOPOLOGY

IDENTIFIERS: (U) WUAFOSR2304K3, PE61103F

AD-A175 075

AD-A175 073 .12 2/0.20 9/0

CLARKSON UNIV POTSDAM NY DEPT OF MATHEMATICS AND COMPUTER SCIENCE

(U) Nonlinear Wave Propagation.

DESCRIPTIVE NOTE: Progress rept. 1 Oct 85-28 Apr 86,

APR 86 4P

PERSONAL AUTHORS: Ablowitz,Mark J. ;

CONTRACT NO. AFOSR-84-0005

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-86-2192

UNCLASSIFIED REPORT

ABSTRACT: (U) The central theme involved in this work is the continuing study of certain fundamental features associated with the nonlinear wave propagation arising in and motivated by physical problems. The usefulness of the work is attested to by the varied applications, and wide areas of interest in physics, engineering and mathematics. The work accomplished involves wave propagation in a number of areas including fluid mechanics, plasma physics, theoretical physics, statistical mechanics, nonlinear optics, multidimensional solitons, multidimensional inverse problems, Painleve equations, direct linearizations of certain nonlinear wave equations, DBAR problems, Riemann-Hilbert boundary value problems, differential geometry, etc.

DESCRIPTORS: (U) *NONLINEAR PROPAGATION ANALYSIS, *PLASMAS(PHYSICS), *STATISTICAL MECHANICS, DIFFERENTIAL GEOMETRY, EQUATIONS, FLUID MECHANICS, INVERSION, NONLINEAR SYSTEMS, OPTICS, PHYSICS, WAVE PROPAGATION, WAVES

IDENTIFIERS: (U) WUAFOSR2304A4, PE61102F

AD-A175 073

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 072 .12 2/0.20 4/0

PEDA CORP PALO ALTO CA

(U) Closing Developments in Aerodynamic Simulation with Disjoint Patched Meshes.

DESCRIPTIVE NOTE: Final rept. 15 May 83-14 May 85,

AUG 86 55P

PERSONAL AUTHORS: Lombard,Charles K. ;Venkatapathy, Ethiraj ;Bardina,Jorge ;Nagaraj,N. ;

CONTRACT NO. F49620-83-C-0084

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-86-2116

UNCLASSIFIED REPORT

ABSTRACT: (U) This research sought to provide computational tools and procedures as the building blocks for a system to permit efficient solution and hisgh resolution capture of flow structure in gasdynamic problems of realistically complex geometries. the research yielded a comparatively simple algebraic procedure for constructing two and three dimensional geometry fitted base level composite meshes in quadrilateral patches. The method provides complete control of coordinate distribution and gradient on all patch boundaries which may include slope discontinuities. A robust upwind implicit method (CSCM) was the basis to solve the multidimensional pseudo time dependent Euler or compressible Navier-Stokes equations. Research into solution algorithms for that upwind method yielded a more robust diagonally dominant (DDADI) approximate factorization that subsequently led to a family of rapidly convergent and data storage and management efficient relaxation schemes in two and three space dimensions. Those operationally explicit and unconditionally stable upwind algorithms have led to a simple robust boundary procedure based on interpolation of conservative variable data from adjacent patches overlying interior patch boundaries where coordinates are discontinuous.

AD-A175 072

AD-A175 072 CONTINUED

DESCRIPTORS: (U) *GAS DYNAMICS, AERODYNAMICS, ALGORITHMS, BOUNDARIES, COMPRESSIBLE FLOW, COMPUTATIONS, CONTROL, CONVERGENCE, COORDINATES, DATA STORAGE SYSTEMS, DISCONTINUITIES, DISTRIBUTION, FLOW, GEOMETRY, INTERNAL, INTERPOLATION, MESH, MODULAR CONSTRUCTION, NAVIER STOKES EQUATIONS, SIMULATION, SLOPE, SOLUTIONS(GENERAL), THREE DIMENSIONAL, TWO DIMENSIONAL, VARIABLES, GRIDS, RELAXATION, GRADIENTS, TIME DEPENDENCE, APPROXIMATION(MATHEMATICS), DATA MANAGEMENT

IDENTIFIERS: (U) Upwind method, Algebraic grid generation, Approximate factorization, WUAFOSR2304A3, PE61102F

AD-A175 072

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 071 .20 4/0.21 2/0

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Chemical Reactions in Turbulent Mixing Flows.

DESCRIPTIVE NOTE: Annual rept. Apr 85-Apr 86.

JUN 86 117P

PERSONAL AUTHORS: Dimotakis,P. E. ;Broadwell,J. E. ; Leonard,A. ;

CONTRACT NO. AFOSR-83-0213

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-2123

UNCLASSIFIED REPORT

ABSTRACT: (U) Work is continuing primarily in gas phase turbulent mixing and chemical reactions. The liquid phase work to date is in its final stages of being analyzed and documented for dissemination in the form of archival publications. In the gas phase shear layer work, investigations are concentrating on shear layer free stream density ratio effects, finite kinetic rate (Damkohler number) effects, and a design effort in support of the planned extension of the work to supersonic flows. In jet flows, progress has been made in the gas phase laser Rayleigh scattering techniques developed for conserved scalar measurements down to diffusion space and time scales. A new technique has been developed under joint support with the Gas Research Institute that permits the imaging of soot sheets in trubulent flames and is being used to describe the combustion flame sheets in methane flames. Theoretical work in progress is addressing the finite chemical rate problem as well as the diffusion-limited shear layer mixing problem. Advances in our data acquisition capabilities during the last year are permitting higher temporal resolution measurements to be taken with digital image arrays.

DESCRIPTORS: (U) *COMBUSTION, *GAS FLOW, ARCHIVES, ARRAYS, CHEMICAL REACTIONS, DATA ACQUISITION, DIGITAL SYSTEMS, DOCUMENTS, FLAMES, GASES, IMAGES, JET FLOW, LIQUID PHASES, MEASUREMENT, METHANE, MIXING, SCALAR FUNCTIONS, SCALE, SHEETS, SOOT, SUPERSONIC FLOW, THEORY, TIME, TURBULENT FLOW, WORK, SHEAR PROPERTIES, RAYLEIGH SCATTERING, LASER APPLICATIONS, REACTION KINETICS, DIFFUSION

IDENTIFIERS: (U) Turbulent mixing flow, Shear flow, Damkohler number, WUAFOSR2308A2, PE61102F

AD-A175 071

AD-A175 071

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 070 .20 4/0

GRUMMAN CORP BETHPAGE NY CORPORATE RESEARCH CENTER

(U) Study of Separation and Vortices in Rotational Inviscid Flows.

DESCRIPTIVE NOTE: Annual rept. Jul 85-Jun 86,

OCT 86 19P

PERSONAL AUTHORS: Marconi,Frank ;

REPORT NO. RE-727

CONTRACT NO. F49620-85-C-0115

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-86-2110

UNCLASSIFIED REPORT

ABSTRACT: (U) An investigation of the power of the Euler equations in the prediction of supersonic separated flows is presented. These equations are solved numerically for the highly vortical flow about simple bodies. Two sources of vorticity are studied: the first is the flow field shock system and the second is the vorticity shed into the flow field from a separating boundary layer. Both sources of vorticity are found to produce separation and vortices. In the case of shed vorticity the surface point from which the vorticity is shed (i.e., separation point) is determined empirically. Solutions obtained with both sources of vorticity are studied in detail, compared with each other, and with potential calculations and experimental data. Keywords: Fluid mechanics; Vortex flows; Supersonic flows.

DESCRIPTORS: (U) *VORTEX SHEDDING, *INVISCID FLOW, *FLOW SEPARATION, *SUPERSONIC FLOW, *VORTICES, FLOW, BOUNDARY LAYER, EQUATIONS, FLOW FIELDS, FLUID MECHANICS, ROTATION, SURFACES, DIFFERENTIAL EQUATIONS, SHOCK TESTS, COMPUTATIONS, SEPARATION, SOURCES

IDENTIFIERS: (U) *Vortex flow, WUAFOSR2307C1, PE61102F

AD-A175 070

AD-A175 060 .12 3/0

CALIFORNIA UNIV RIVERSIDE DEPT OF STATISTICS

(U) Non-Orthogonal Designs for Measuring Dispersion.

DESCRIPTIVE NOTE: Interim rept. Jul-Sep 86,

SEP 86 16P

PERSONAL AUTHORS: Ghosh,Subir ;

REPORT NO. TR-148

CONTRACT NO. AFOSR-86-0048

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2130

UNCLASSIFIED REPORT

ABSTRACT: (U) Dispersion effects are considered in addition to Location effects of factors in the inferential procedure of sequential factor screening experiments with m factors each at two levels under search linear models. Search designs in measuring Dispersion and Location effects of factors are presented for both stage one and stage two of factor screening experiments with 4 < or = m < or = 10.

DESCRIPTORS: (U) *STATISTICAL INFERENCE, *DISPERSION RELATIONS, *SEQUENTIAL ANALYSIS, FACTOR ANALYSIS, ORTHOGONALITY, LINEARITY, MATHEMATICAL MODELS, SEARCHING

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A175 060

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 059 .20 6/0

MINNESOTA UNIV MINNEAPOLIS

(U) Structure from Motion.

DESCRIPTIVE NOTE: Final rept. Jul 83-30 Sep 85,

DEC 85 53P

PERSONAL AUTHORS: Thompson,William B. ;

CONTRACT NO. F49620-83-C-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2132

UNCLASSIFIED REPORT

ABSTRACT: (U) Work on improving gradient-based methods for optical flow estimation has been completed. An understanding of how errors arise makes it possible to define the inherent limitations of the gradient-based technique, obtain estimates of the accuracy of computed values, enhance the performance of the technique, and demonstrate the informative value of some types of errors. Significant results have been achieved on the problems associated with motion-based segmentation. An approach based on understanding the three-dimensional scene structure leading to an edge in optical flow has been developed. As a result, it is possible to simultaneously detect edges and determine important three-dimensional properties of the associated scene surfaces. The methods which have been developed make it possible to distinguish between occluding and occluded surfaces at a boundary. This technique may make it possible to link image regions corresponding to a partially occuled object and to produce descriptions of object boundaries that are less affected by occlusion. In addition, being able to distinguish between occluding and occluded boundaries is a crucial step towards determining the three-dimension position of surfaces. Keywords: image understanding, visual motion.

DESCRIPTORS: (U) *OPTICAL PROCESSING, *OPTICAL IMAGES, ACCURACY, BOUNDARIES, ESTIMATES, FLOW, MOTION, STRUCTURES,

AD-A175 059

AD-A175 059 CONTINUED

THREE DIMENSIONAL, VISION, SEGMENTED

IDENTIFIERS: (U) Image understanding, PE61102F, WUAFOSR2304A5

AD-A175 059

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 058 12 3/0

HONEYWELL SYSTEMS AND RESEARCH CENTER MINNEAPOLIS MN

(U) Robust Control of Multivariable and Large Scale Systems.

DESCRIPTIVE NOTE: Final rept. Jul 84-Oct 85.

MAR 86 185P

PERSONAL AUTHORS: Doyle,John C. ;Chu,Cheng C. ;

CONTRACT NO. F49620-84-C-0066

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2173

UNCLASSIFIED REPORT

ABSTRACT: (U) New methods are presented for analysis and synthesis of control systems subject to structured uncertainties. The technical approach involves the structured singular value, as an analysis tool and H infinity as a synthesis tool. Alternative formulations are compared with the H infinity approach, extensions of mu to handle real parameter problems are presented, and the issue of the convergence of mu synthesis to a global optimum is studied. A comprehensive solution for the synthesis of general optimal controllers is given for linear lumped time-invariant systems. The existence of an optimal solution for H inifinity optimization is proved, and some properties of this solution are discovered. The method called Euler's constant iteration is presented and its convergence properties are established. A new algorithm for solving a class of algebraic riccati equations is obtained Explicit error bounds for model reduction in the synthesis process are derived. The constructions use standard matrix operations and linear algebra applied to state-space representations of linear systems.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *MULTIVARIATE ANALYSIS, ALGORITHMS, CONSTANTS, CONTROL, CONVERGENCE, EULER ANGLES, INVARIANCE, ITERATIONS, LINEAR ALGEBRA, LINEAR SYSTEMS, METHODOLOGY, OPTIMIZATION, PARAMETERS,

AD-A175 058

AD-A175 058 CONTINUED

REDUCTION, RICCATI EQUATION, SOLUTIONS(GENERAL), SYNTHESIS, TIME, TOOLS, VALUE, MATHEMATICAL MODELS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 056 .12 2/0.20 4/0

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Three-Dimensional Viscous Flow Solutions with a Vorticity - Stream Function Formulation.

DESCRIPTIVE NOTE: Final rept. for period ending 1 Mar 84.

MAY 86 125P

PERSONAL AUTHORS: Davis,R. L. ;Carter,J. E. ;Hafez,M. ;

CONTRACT NO. F49620-84-C-0032

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2133

UNCLASSIFIED REPORT

ABSTRACT: (U) A three-dimensional streamlike function/ vorticity transport procedure has been developed to analyze two- and three-dimensional inviscid and viscous flows. Both the formulation and the numerical techniques used to solve these equations contain many of the advantages of interacting boundary layer theory for strongly interacting viscous and inviscid flows. An algorithm which involves the solution of two uncoupled Poisson/vorticity transport equation sets is described. An implicit line relaxation scheme is used to solve a 2 x 2 block-tridiagonal system for the Poisson and vorticity transport equations in each of the x- and z-directions. Solutions for 2-D and 3-D inviscid and viscous flows are compared with other numerical solutions demonstrating the stability and accuracy of the current procedure. Favorable agreement with the recently obtained 3-D interacting boundary layer solutions of Edwards demonstrates the overall accuracy of this new approach for 3-D viscous flows including flow separation. This streamlike function/vorticity transport procedure has been found to yield smooth solutions without the need to add explicit artificial viscosity. Keywords: stream function; finite difference coefficients; Navier Stokes equations.

DESCRIPTORS: (U) *INVISCID FLOW, *THREE DIMENSIONAL FLOW,

AD-A175 056

AD-A175 056 CONTINUED

*VISCOUS FLOW, *VORTICES, ACCURACY, VISCOSITY, FLOW SEPARATION, FLOW, INTERACTIONS, RELAXATION, NUMERICAL ANALYSIS, SOLUTIONS(GENERAL), FUNCTIONS(MATHEMATICS), ALGORITHMS, BOUNDARY LAYER, THEORY, NAVIER STOKES EQUATIONS, NUMERICAL METHODS AND PROCEDURES, FORMULATIONS, TWO DIMENSIONAL FLOW, POISSON EQUATION, FINITE DIFFERENCE THEORY, COEFFICIENTS, VORTICES, EQUATIONS, TRANSPORT PROPERTIES

IDENTIFIERS: (U) Stream functions, WUAFOSR2307A1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 055 12 6/0

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) On the Analysis of Synchronous Computing Arrays.

86 62P

PERSONAL AUTHORS: Jover,J. M. ;Kailath,T. ;Lev-Arin,H. ; Rao,S K. ;

CONTRACT NO. DAAG29-83-K-0028, AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR TR-86-2171

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Contracts N00039-84-C-0211 and N00014-85-K-0612.

ABSTRACT: (U) This paper is concerned with the analysis of synchronous, special purpose, multiple-processor systems, including, e.g., systolic arrays. There have been some results on this problem, especially by Melhem and Rheinboldt. Our approach is different, combing ideas well known in linear system theory with certain graph-theoretical concepts from computer science. A by-product of our approach to the analysis program is a rigorous characterization of the notion of equivalence between iterative algorithms.

DESCRIPTORS: (U) *COMPUTERS, *COMPUTER ARCHITECTURE, ALGORITHMS, ITERATIONS, LINEAR SYSTEMS, THEORY

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A8

AD-A175 053 12 1/0 13 8/0

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) A Survey of Network Reliability Modeling and Calculations.

OCT 86 7P

PERSONAL AUTHORS: Lam,Y. F. ;Li,Victor O. ;

CONTRACT NO. AFOSR-84-0269

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2141

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of IEEE MILCOM, p1-4 Oct 86.

ABSTRACT: (U) A brief survey of the subject of network reliability is presented. Network reliability is the study of network performance when components of the network are subject to failures. The problem can be divided into two main parts: the modeling of component failures, the assumption that component failures are statistically independent is often made to simplify the problem. But this assumption is unrealistic in most real-world situations. In this survey, special attention is given to recent developments in modeling statistically dependent failures of network components. For reliability calculations, only analytical techniques are considered, and simulations are excluded. A brief classification of existing techniques is given. Since most network reliability problems are NP-hard, exact techniques to calculate network reliability can only handle problems of limited sizes, and therefore approximate techniques are of practical importance. Both exact and approximate techniques are covered in this survey.

DESCRIPTORS: (U) *FAILURE(MECHANICS), *MODELS, *COMPUTATIONS, *RELIABILITY, PARTS, LIMITATIONS, SIZES(DIMENSIONS), NETWORKS

AD-A175 053

AD-A175 053 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A175 052 .7 4/0

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Isomers of Si2 C2: An MBPT Study.

86 7P

PERSONAL AUTHORS: Trucks,Gary W. ;Bartlett,Rodney J. ;

CONTRACT NO. AFOSR-85-0011

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-88-2154

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Structure (Theochem) v135 p423-428 1986.

ABSTRACT: (U) The structure of the low-lying electronic states of the unknown Si2C2 system is studied using full fourth-order Many Body Perturbation Theory (MBPT). It is concluded that the lowest-lying structure is a rhombus, superscript 1 A sub g state, which is ca. 12 kcal/mol lower than the linear superscript 3 sigma g (-) state. This is similar to the C4 system. The rhombus structure accommodates reluctance of silicon to form stable multiple bonds. Vibrational frequencies are reported.

DESCRIPTORS: (U) *ELECTRONIC STATES, *SILICON CARBIDES, ELECTROMAGNETIC PROPERTIES, FREQUENCY, LOW LEVEL, PERTURBATION THEORY, RHOMBUS, VIBRATION, N BODY PROBLEM, COVALENT BONDS, CRYSTAL STRUCTURE, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 051 9 1/0.12 8/0

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR COMPUTER SCIENCE

(U) Theoretical Aspects of VLSI (Very Large Scale Integration) Circuit Design.

DESCRIPTIVE NOTE: Annual rept. Sep 83-Jan 86.

JAN 86 10P

PERSONAL AUTHORS: Leighton,F. T. ;

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-86-2168

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period covered by the grant, two books and ten research papers were written under grant sponsorship. In addition nineteen of the research papers were written and published in conference proceeding. Ten other research manuscripts are now nearing completion. Titles of some of the completed work include: EIGNENVALUES AND EXPANDERS, A FRAMEWORK OF SOLVING VLSI GRAPH LAYOUT PROBLEMS, TIGHT BOUNDS ON THE COMPLEXITY OF PARALLEL SORTING, WAFER-SCALE INTERGRATION OF SYSTOLIC ARRAYS, and THE AVERAGE CASE ANALYSIS OF SOME ON-LINE ALGORITHMS FOR BIN PACKING.

DESCRIPTORS: (U) *CIRCUITS, *COMPUTER ARCHITECTURE, *INTEGRATION, ALGORITHMS, LINE SYSTEMS, PARALLEL ORIENTATION, SORTING, DOCUMENTS, BOOKS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2

AD-A175 051

AD-A175 049 20 8/0

MICHIGAN UNIV ANN ARBOR DEPT OF NUCLEAR ENGINEERING

(U) Interaction of Charged Particle Beams with Pre-Ionized Channels.

DESCRIPTIVE NOTE: Final rept. 30 Sep 82-29 Sep 85.

SEP 85 13P

PERSONAL AUTHORS: Kammash,T. ;Les,J. ;

CONTRACT NO. AFOSR-82-0339

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-86-2179

UNCLASSIFIED REPORT

ABSTRACT: (U) A Monte Carlo Fokker Planck Code is used to investigate the scattering loss of particles from a relativistic electron beam propagating in a low pressure air channel. Two special cases are examined. The first corresponds to an experiments in which a one cm radius, 90 KeV beam propagates in hydrogen channel of the same radius, 50 cm long with a density of 10 cm an da temperature of 0.5 eV assuming the interaction to take place only with the charged particles of the medium. It is shown that the beam will traverse such channel if the ionization drop s below 20% noting that for such parameters the channel pressure corresponds to few tens of militors. The second case corresponds to what is referred to as the Ion Focused Regime where the pressure is about 0.1 torr. Scattering of beam particles by both neutral and charged particles is taken into account in this case as well as multiple scattering form neutral targets. It is shown that transmitted fraction is linearly proportional to the square of the channel radius, and the probability of multiple scattering increases with increasing channel radius.

DESCRIPTORS: (U) *ELECTRON SCATTERING, *ELECTRON BEAMS, CHANNELS, PRESSURE, CHARGED PARTICLES, PARTICLE BEAMS, LOW ALTITUDE, LOW PRESSURE, NEUTRAL, TARGETS, IONIZATION, RADIUS(MEASURE), HYDROGEN, LOSSES, SCATTERING, FOKKER

AD-A175 049

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

[illegible] CONTINUED

[illegible] EQUATIONS, MONTE CARLO METHOD, AIR, FOCUSING, [illegible] THEORY

IDENTIFIERS (U) IFR(Ion Focused Regime), PE61102F, WUAFOSR2301A7

AD-A175 047 .12 1/0.20 10/0

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) *Fifth-Order Many-Body Perturbation Theory and its Relationship to Various Coupled-Cluster Approaches*,

86 64P

PERSONAL AUTHORS: Kucharski,Stanislaw A. ;Bartlett,Rodney J. ;

CONTRACT NO. AFOSR-85-0011

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR TR-86-2118

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Advances in Quantum Chemistry, v18 p281-344 1986.

ABSTRACT: (U) An analysis has been made of fifth order many body perturbation theory and its relationship to various coupled cluster approaches. The results show that the calculation of the fifth order energy is feasible and when carefully implemented may be applied to moderate sized systems. The number os terms that must be considered may be substantially reduced by taking into account the fact that many of the diagrams have identical values and many are amenable to factorization. (Reprints).

DESCRIPTORS: (U) *CLUSTERING, *N BODY PROBLEM, *PERTURBATION THEORY, BODIES, REPRINTS, ENERGY, QUANTUM THEORY

IDENTIFIERS: (U) Rayleigh schroedinger theory, PE61102F, WUAFOSR2301A4

AD-A175 049

AD-A175 047

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 040 .21 2/0.21 4/0

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Fuels Combustion Resaearch.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 85-30 Sep 86.

OCT 86 62P

PERSONAL AUTHORS: Dryer,F. L. ;Glassman,I. ;Williams,F. A. ;

CONTRACT NO. F49620-86-C-0006

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-2107

UNCLASSIFIED REPORT

ABSTRACT: (U) After great progress related to soot formation in normal diffusion flames, studies of near sooting inverse diffusion flames were begun to determine controlling precursors. Stable, temperature controlled inverse diffusion flames have been successfully developed and numerous chemical samples extracted and analyzed. Observed trends are being studied. The side chain oxidation of n-butyl benzene was found to follow the same processes as the smaller n-alkyl benzenes; abstraction, alkyl group displacement and thermal cleavage. The results have led to development of a simple general, mechanistic model for the oxidation of n-alkyl benzenes. Combustion property observations of isolated boron droplets were extended to boron/JP-10 slurries with various solid loadings. Some physical understanding of observed droplet-burning and disruption behavior was developed. Quasi-spherical hollow shells of the boron agglomerate with blowholes support the hypothesis of the formation of the impermeable shell and subsequent disruption of the primary slurry droplet. Boron suspension (cloud) combustion in the hot reaction products of a flat-flame burner has been pursued. The boric acid fluctuation bands were identified spectroscopically, and conditions for their flame occurrence measured. The work progresses toward establishment of ignition conditions and combustion times of 0.1-5 micron boron particles.

AD-A175 040 CONTINUED

DESCRIPTORS: (U) *SLURRY FUELS, *COMBUSTION, *BORON, *BENZENE COMPOUNDS, *SOOT, PERMEABILITY, AGGLOMERATES, SHELLS(STRUCTURAL FORMS), DROPS, SLURRIES, DROPS, ISOLATION, CHAINS, OXIDATION, SIDES, CLEAVAGE, THERMAL PROPERTIES, ALKYL RADICALS, DISPLACEMENT, CHEMICALS, SAMPLING, OBSERVATION, FUELS, HYPOTHESES, BORIC ACID, VARIATIONS, HEAT OF REACTION, REACTANTS(CHEMISTRY), IGNITION, BAND SPECTRA, COLLOIDS, CLOUDS, PRECURSORS, JET ENGINE FUELS, DIFFUSION

IDENTIFIERS: (U) Soot formation, Aromatic fuel oxidation, Boron slurry combustion, Boron cloud combustion, Diffusin flames, JP-10 fuel, PE61102F, WUAFOSR2308A2

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 035 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On Stationarity of the Solution of a Doubly Stochastic Model,

86 11P

PERSONAL AUTHORS: Pourahmadi,Mohsen ;

REPORT NO. TR-81

CONTRACT NO. F49620-85-C-0144, NSF-MCS83-01240

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2143

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Time Series Analysis, v7 n2 p123-131 1986.

ABSTRACT: (U) This document considers the discrete parameter process (x sub t) satisfying the doubly stochastic model (X sub T) satisfying the doubly stochastic model X s:b T = phi sub t sub t-1 t epsilon sub t, where (phi sub t) and (epsilon sub t) are also stochastic processes. Necessary and sufficient conditions on (phi sub t) are given for (x sub t) to be a second order process. When (x sub t) is a strictly stationary process, some sufficient conditions in terms of (x sub t) are given which guarantee the wide sense stationary of (x sub t). It turns out that for these problems the distribution and dependence structure of the process (log/ phi sub t/) play an important role. Keywords: Stochastic models.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *STOCHASTIC PROCESSES, PARAMETERS, STATIONARY

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A175 034 .5 3/0

NORTH CAROLINA UNIV AT CHARLOTTE DEPT OF MATHEMATICS

(U) Replacement with Non-Constant Operating Cost,

86 57P

PERSONAL AUTHORS: Anderson,R. F. ;

CONTRACT NO. AFOSR-80-0245

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2144

UNCLASSIFIED REPORT

ABSTRACT: (U) The long run average cost problem is considered in the case of a non-decreasing Markov wear process with failure determined by a random threshold. The method of analysis is to first consider the discounted problem and then let the discount factor go to zero.

DESCRIPTORS: (U) *COST ANALYSIS, COSTS, THRESHOLD EFFECTS, STOCHASTIC CONTROL, MARKOV PROCESSES, WEAR, REPLACEMENT, OPTIMIZATION

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 033 .20 4/0

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) The Study of Shock Wave and Turbulent Boundary Layer Interactions.

DESCRIPTIVE NOTE: Final rept. 1 Aug 84-31 Jul 86,

NOV 86 43P

PERSONAL AUTHORS: Bogdonoff,Seymour M. ;

REPORT NO. 1767-MAE

CONTRACT NO. F49620-84-C-0086

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2175

UNCLASSIFIED REPORT

ABSTRACT: (U) The three dimensional shock wave turbulent boundary layer interaction generated by several shock generators defined solely by angles has been carried out at a Mach number of 3. Interactions with thin boundary layers were used to obtain overall characteristics, while interactions with thick boundary layers permitted detailed high resolution surveys. Investigations of the interactions were carried out by mean and high frequency surface pressure distribution measurements, surface flow visualization, and mean total head, yaw, and static pressure distributions through the flowfield. Major new data sets were obtained for the interaction of the shock wave generated by a 20 deg fin, and by a 24 deg wedge swept at 60 deg to the incoming flow. A series of tests were carried out to examine new concepts of three-dimensional interactions and extensive 'non-steady' results were obtained from the high frequency surface pressure distributions. Close coordination of the experiments with major computational efforts, support new concepts of flow structure and physics for these complex interactions. Keywords: Three-dimensional shock wave interactions; Conical similarity; Scaling laws; Conical/ cylindrical boundary; Unsteady flow; Non-steady

AD-A175 033

AD-A175 033 CONTINUED

characteristics; flow physics and modeling; Supersonic characteristics.

DESCRIPTORS: (U) *TURBULENT BOUNDARY LAYER, *SHOCK WAVES, INTERACTIONS, FLOW, PHYSICS, FLOW FIELDS, SCALING FACTORS, GENERATORS, BOUNDARIES, CONICAL BODIES, CYLINDRICAL BODIES, HIGH RESOLUTION, SURVEYS, DATA BASES, TEST AND EVALUATION, PRESSURE MEASUREMENT, FINS, WEDGES, HIGH FREQUENCY, PRESSURE DISTRIBUTION, STATIC PRESSURE, BOUNDARY LAYER, THICKNESS, THREE DIMENSIONAL, SUPERSONIC CHARACTERISTICS, FLOW VISUALIZATION, SURFACES, UNSTEADY FLOW, YAW

IDENTIFIERS: (U) Surface pressure, Conical similarity, Nonsteady characteristics, WUAFOSR2307A1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 031

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) System Structure Analysis: Clustering with Data Bindings.

AUG 85 10P

PERSONAL AUTHORS: Hutchens,David H. ;Basili,Victor R. ;

CONTRACT NO. F49620-80-C-0001

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-86-2159

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Software Engineering, vSE-11 n8 p749-757 Aug 85.

ABSTRACT: (U) This paper examines the use of cluster analysis as a tool for system modularization. Several clustering techniques are discussed and used on two medium-size systems and a group of small projects. The small projects are presented because they provide examples (that will fit into a paper) of certain types of phenomena. Data bindings between the routines of the system provide the basis for the bindings, It appears that the clustering of data bindings provides a meaningful view of system modularization.

DESCRIPTORS: (U) *CLUSTERING, *SYSTEMS ANALYSIS, FOOTWEAR, STRUCTURAL ANALYSIS

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F

AD-A175 030 .11 6/1

ILLINOIS UNIV AT URBANA DEPT OF MATERIALS SCIENCE

(U) Al and Mg Alloys for Aerospace Applications Using Rapid Solidification and Powder Metallurgy Processing.

DESCRIPTIVE NOTE: Annual technical rept. no. 1, May 85-May 86,

NOV 86 109P

PERSONAL AUTHORS: Fraser,Hamish L. ;

CONTRACT NO. AFOSR-85-0191

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-86-2114

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers the progress made in the first year of a three year study on the rapid solidification processing (RSP) of Al-and Mg based alloys. In this study, effort has been applied in three areas: (1) Processing (both particulate production and consolidation) , 2) Microstructural effects, and (3) Mechanical Properties. The underlying objective has been to control the microstructure to obtain favorable mechanical properties. This will, perforce, entail a detailed understanding of the microstructures, as affected by factors such as alloy chemistry and processing variables, and, in turn, their effects on the mechanical properties. The microstructural changes which occur in heat-treated, as-rapidly solidified materials, as well as those in materials consolidated, either by extrusion or by the relatively new technique of dynamic compaction, have been investigated. The alloy systems studied include: (1) high modules Al alloys, namely, Al-Mn and Al-Be, (2) Al alloys for elevated temperature applications, namely, Al-8Fe-2Mo, and (3) Mg alloys for elevated temperature applications, namely, Mg-20Gd and Mg-Li-Si. The report is divided into three major sections: (1) Brief overview of RSP of individual alloys, (2) Results, and (3) Future work. Individual sections are further subdivided as appropriate.

AD-A175 030 CONTINUED

DESCRIPTORS: (U) *ALUMINUM ALLOYS, *MAGNESIUM ALLOYS, MOLYBDENUM ALLOYS, IRON ALLOYS, MANGANESE ALLOYS, GADOLINIUM ALLOYS, LITHIUM ALLOYS, SILICON ALLOYS, BERYLLIUM ALLOYS, AEROSPACE SYSTEMS, COMPACTING, DYNAMICS, EXTRUSION, MICROSTRUCTURE, POWDER METALLURGY, PROCESSING, ALLOYS, CHEMISTRY, TEMPERATURE, MECHANICAL PROPERTIES, PARTICULATES, PRODUCTION, SOLIDIFICATION, QUICK REACTION

IDENTIFIERS: (U) WUAFOSR2306A1, PE61102F

AD-A175 029 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Distribution of the Maximum of a Gaussian Process by Monte Carlo.

DESCRIPTIVE NOTE: Technical rept. 1 Sep 85-30 Sep 86,

JUL 86 32P

PERSONAL AUTHORS: Hasofer,A. M. ;

REPORT NO. TR-147

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2147

UNCLASSIFIED REPORT

ABSTRACT: (U) First a simple practical procedure for approximating a stationary Gaussian process over a finite interval by a trigonometric polynomial with predetermined error is described. The approximation is then used to calculate the distribution of the maximum, using a novel Monte Carlo method with a control variable which drastically reduces the variance. Finally, the outlined approach is compared to the moving-average technique and shown to be superior for continuous-time, narrow-band processes.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, APPROXIMATION(MATHEMATICS), MONTE CARLO METHOD, NARROWBAND, POLYNOMIALS, TRIGONOMETRY, STATIONARY

IDENTIFIERS: (U) *Guassian Processes

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 028 .12 3/0

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Asymptotic Properties of Distributed and Communicating Stochastic Approximation Algorithms.

FEB 86 58P

PERSONAL AUTHORS: Kushner,Harold J. ;Yin,G. ;

REPORT NO. LCDS-86-11

CONTRACT NO. N00014-83-K-0542, AFOSR-81-0116

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-86-2140

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Contracts DAAG29-84-K-0542 and N00014-85-K-0607.

ABSTRACT: (U) The asymptotic properties of extensions of the type of distributed or decentralized stochastic approximation proposed are developed. Such algorithms have numerous potential applications in decentralized estimation, detection and adaptive control, or in decentralized Monte Carlo simulation for system optimization (where they can exploit th possibilities of parallel processing). The structure involves several isolated processors (recursive algorithms) who communicate to each other asyhnchronously and at random intervals. The asymptotic (small gain) properties are derived. The communication intervals need not be strictly bounded and they and the system noise can depend on the (communicating) system state. State space constraints are also handled. In many applications, the dynamical terms are merely indicator functions, or have other types of discontinuities. The typical such case is also treated, as is the case where there is noise in the communication. The linear stochastic differential equation satisfied by the (interpolated) asymptotic normalized error sequence is derived, and issued to compare alternative algorithms and communication strategies. Weak convergence methods

AD-A175 028

AD-A175 028 CONTINUED

provide the basic tools.

DESCRIPTORS: (U) *ALGORITHMS, *ASYMPTOTIC NORMALITY, ADAPTIVE CONTROL SYSTEMS, APPROXIMATION(MATHEMATICS), ASYMPTOTIC SERIES, DECENTRALIZATION, DETECTION, ERRORS, ESTIMATES, GAIN, INDICATORS, INTERVALS, LINEAR DIFFERENTIAL EQUATIONS, MONTE CARLO METHOD, NOISE, OPTIMIZATION, PARALLEL PROCESSING, RECURSIVE FUNCTIONS, SEQUENCES, SIMULATION, STOCHASTIC PROCESSES, STRATEGY

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 026 20 4/0 21 5/0

SCIENTIFIC RESEARCH ASSOCIATES INC GLASTONBURY CT

(U) Flow through a Compressor Stage.

DESCRIPTIVE NOTE: Final rept. 21 Jun 83-31 May 86,

MAY 86 58P

PERSONAL AUTHORS: Gibeling,H. J. ;Weinberg,B. C. ; Shamroth,S. J. ;McDonald,H. ;

REPORT NO. R86-910004-F

CONTRACT NO. F49620-83-C-0119

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-86-2161

UNCLASSIFIED REPORT

ABSTRACT: (U) The present effort has led to the development of a numerical procedure of the stage flow field based upon solution of the Navier-Stokes equations. The specific case considered is the basic case in which two-dimensional flow and equal rotor and stator pitch are assumed. The procedure developed is capable of obtaining periodic solutions for a grid of 7500 points within ten CPU minutes of Cray run time. This represents a very efficient technique which will permit runs of this type on a regular basis, and which will allow extension to either three dimensions or to stages in which rotor and stator have unequal pitch and the multiple stages. The results obtained show the qualitatively expected features. Periodicity was obtained essentially within five cycles. The major effect of the interaction to the specific case considered appeared in the leading edge region of the downstream rotor blade. Significant perturbation pressures were noted, Delta Cp approx. = 0.4, which has major implications regarding unsteady loading and unsteady fluid structure interaction. The concentration of the interaction effect in the leading edge has particular significance in regard to unsteady pitching moment. Although less significant, unsteady effects were noted over the aft portion of the trailing blade, as well

AD-A175 026

AD-A175 026 CONTINUED

as over the entire leading blade.

DESCRIPTORS: (U) *AIR FLOW, COMPRESSORS, STAGING, INTERACTIONS, LEADING EDGES, REGIONS, NUMERICAL METHODS AND PROCEDURES, PITCH(MOTION), STATORS, TWO DIMENSIONAL FLOW, DOWNSTREAM FLOW, ROTOR BLADES, LEADING EDGES, NAVIER STOKES EQUATIONS, MATHEMATICAL MODELS, COMPUTERIZED SIMULATION, BLADES

IDENTIFIERS: (U) WUAFOSR2307A4, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 024 .11 4/0.20 11/0.22 2/0

MATERIALS SCIENCES CORP SPRING HOUSE PA

(U) Thermoviscoelastic Characterization and Analysis of Fiber Composite Space Structures.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-31 Dec 85,

FEB 86 170P

PERSONAL AUTHORS: Sullivan,B. J. ;Humphreys,E. A. ;Hashin, Zvi ;

REPORT NO. MSC-TFR-1614/1505

CONTRACT NO. F49620-85-C-0004

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-86-2111

UNCLASSIFIED REPORT

ABSTRACT: (U) This report begins with the development of the time and temperature-dependent effective constitutive equations for unidirectional fiber composites. The fibers were represented as transversely isotropic and linearly elastic, temperature dependent elements. The deviatoric components of the isotropic matrix material were treated as linearly viscoelastic and thermorheologically complex, while the dilatation components were represented as elastic and temperature dependent. Numerical simulations of a series of isothermal creep tests were performed to determine the effective creep compliance parameters of the composite constitutive equations. The macromechanical response of a composite structural element, as predicted by the effective constitutive equations and their derived parameters, was then verified using results computed using a micromechanical model which explicitly included the fiber and matrix as discrete phases. To determine the potential existence and form of a composite complex modulus, the response of unidirectional composite structural elements to simultaneous sinusoidal temperature and mechanical loads was investigated. Finally, solutions of free vibration and transient dynamic analyses of some simple composite structures were performed to examine the effects of the thermoviscoelastic behavior on the damped response of some simple composite structures.

AD-A175 024 CONTINUED

DESCRIPTORS: (U) *SPACECRAFT, *COMPOSITE STRUCTURES, *FIBER REINFORCED COMPOSITES, DAMPING, RESPONSE, TIME, ELASTIC PROPERTIES, ISOTROPISM, MATRIX MATERIALS, NUMERICAL ANALYSIS, CREEP, PARAMETERS, EQUATIONS, CREEP TESTS, LOADS(FORCES), THERMOELASTICITY, TIME DEPENDENCE, EPOXY COMPOSITES, DYNAMIC RESPONSE, TRANSIENTS, SOLUTIONS(GENERAL), VIBRATION, THERMAL PROPERTIES, VISCOELASTICITY, FIBER REINFORCED COMPOSITES, UNIDIRECTIONAL, TEMPERATURE, STRUCTURAL MEMBERS, UNIDIRECTIONAL

IDENTIFIERS: (U) Constitutive equations, Space structures, Temperature dependence, Thermoviscoplasticity, Eigensolutions, WUAFOSR2302B1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVJ56L

AD-A175 020 8 10/0 12 1/0 AD-A175 020 CONTINUED

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS OSURF-763420, LPN-OSURF-715927, WUAFOSR2307C1, PE61102F

(U) Variational Principles for Dynamics of Linear Elastic Fluid-Saturated Soils.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 84-31 Jan 85,

JUL 85 48P

PERSONAL AUTHORS: Sandhu,Ranbir S. ;Hong,S. J. ;

REPORT NO OSURF-715927-85-3

CONTRACT NO. AFOSR-83-0065

PROJECT NO 2307

TASK NO C1

MONITOR AFOSR TR-86-2096

UNCLASSIFIED REPORT

ABSTRACT (U) Variational Principles for dynamics of the fluid-saturated porous media are derived assuming that soil is linear elastic and deformation is small. Starting with basic mathematical concepts related to the inverse problem of calculus of variation and following the methodology proposed by Sandhu for coupled problems, general variatonal principles for the problem are developed. Complementary as well as direct formulation are discussed with reference to finite element approximation space and the excitation are allowed for. Extensions of the variational principles to relax smoothness requirements on certain field variables are introduced along with some specializations. Keywords: Coupled problems; Elasticity; Fluid-saturated solids; Seepage, Soil dynamics.

DESCRIPTORS: (U) *SOIL DYNAMICS, MATHEMATICS, COUPLING(INTERACTION), FORMULATIONS, ELASTIC PROPERTIES, INVERSION, CALCULUS, DEFORMATION, DYNAMICS, VARIABLES, LINEARITY, VARIATIONAL PRINCIPLES, SATURATION, SOILS, POROSITY, CALCULUS OF VARIATIONS, FINITE ELEMENT ANALYSIS, DISCONTINUITIES, SEEPAGE

IDENTIFIERS: (U) Saturated soils, Inverse problems, LPN-

AD-A175 020 AD-A175 020

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 019 20 2/0 20 11/0

OKLAHOMA UNIV NORMAN DEPT OF MATHEMATICS

(U) Estimation and Control of Distributed Models for Certain Elastic Systems Arising in Large Space Structures

DESCRIPTIVE NOTE Annual rept 2 Jul 84-1 Jan 86.

86 7P

PERSONAL AUTHORS White,Luther W .

CONTRACT NO AFOSR-84-0271

PROJECT NO 2304

TASK NO A1

MONITOR AFOSR
TR 86 2193

UNCLASSIFIED REPORT

ABSTRACT (U) This project is to study the estimation and control of elastic systems composed of beams and plates in order to develop efficient and accurate estimation and control algorithms. Results have been obtained for the estimation in static beams and plates, control and location of actuators for static beams and plates and identifiability for discrete approximations of second order elliptic boundary value problems. Currently testing codes are being developed for numerical experimentation for estimation of damping and elastic coefficients in dynamic linear plate models, estimation of boundary parameters for second order elliptic problems, estimation of elastic coefficients in cantilevered beams using perturbed boundary conditions, optimal location of actuators for the control of beams and control of plates through forces at points and forces distributed over sets of small measure and curves. The plan is to next investigate boundary control and estimation, estimation and control in structures, use of friction as an active control, and parallelization of estimation and control algorithms.

DESCRIPTORS (U) *SCIENTIFIC SATELLITES, *BENDING, *BEAMS(STRUCTURAL), CONTROL, BOUNDARIES, CANTILEVER BEAMS, MODELS, PLATES, DYNAMICS, LINEAR SYSTEMS, LINEARITY,

AD-A175 019 CONTINUED

MATHEMATICAL MODELS, ACTUATORS, ALGORITHMS, ELASTIC PROPERTIES, APPROXIMATION(MATHEMATICS), DISCRETE DISTRIBUTION, COEFFICIENTS, FLAT PLATE MODELS, BOUNDARY VALUE PROBLEMS, DAMPING, FRICTION, OPTIMIZATION, POSITION(LOCATION), SPACECRAFT, ELLIPSES, DISTRIBUTION, CONTROL SYSTEMS, PARAMETERS

IDENTIFIERS: (U) Large space structures, MUAFOSR2304A1, PE61103F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVJ56L

AD A175 018 9 5/0 12 6/0 20 6/0

BBN ASSOCIATES INC WAYLAND MA

(U) Optical Computing Strategies

DESCRIPTIVE NOTE: Final rept 15 Oct 84-15 Oct 85.

NOV 86 22P

PERSONAL AUTHORS: Barakat,Richard .

CONTRACT NO: F49620-85-C-0001

PROJECT NO: 2306

TASK NO: B4

MONITOR: AFOSR
TR-86-2204

UNCLASSIFIED REPORT

ABSTRACT: (U) The subject of the current research effort is the development of a theory of optical computing. It is generally agreed that optical computing has an advantage over digital computing in situations where parallelism can be exploited. The canonical examples are matrix-vector multiplication and matrix-matrix multiplication. If the matrices are both square and of size (n x n) then outer-product decomposition achieves a saving in computational time because the N2 inner products can be evaluated concurrently. It is outlined in Section 1. Our second completed contribution is the development of a tractable mathematical model of an optical system (assuming incoherent light operations and its use into an investigation of the inherent limits of computation of such a system in terms of a lower bound on the simultaneous resources of volume and computing time. Keywords: Electrooptical, Matrix vector multiplication, Canonical.

DESCRIPTORS: (U) *OPTICAL CIRCUITS, *OPTICAL PROCESSING, COMPUTATIONS, TIME, INCOHERENT SCATTERING, LIGHT, OPERATION, STRATEGY, SYNCHRONISM, MATHEMATICAL MODELS, TRACTABLE, THEORY, MATRICES(MATHEMATICS), ELECTROOPTICS, DIGITAL COMPUTERS

IDENTIFIERS: (U) WUAFOSR230584, PE61102F

AD A175 018

AD-A175 017 11 4/0

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS CENTER

(U) Research on Damage Models for Continuous Fiber Composites

DESCRIPTIVE NOTE: Annual technical rept Feb 85-Feb 86.

FEB 86 290P

PERSONAL AUTHORS: Allen,D H ;Harris,C E ;

REPORT NO: MM-5023-86-5

CONTRACT NO: AFOSR-84-0087

PROJECT NO: 2302

TASK NO: B2

MONITOR: AFOSR
TR-86-2077

UNCLASSIFIED REPORT

ABSTRACT: (U) Continuous fiber composite laminates are know to undergo a substantial amount of complex load-induced damage which can adversely affect component performance. Therefore, it is desirable to develope new models capable of accounting for the effect of damage on materials properties. The objective of this research is to develope an accurate damage model for predicting strength and stiffness of continuous fiber composite media subjected to fatigue or monotonic loading and to verify this model with experimental results obtained from composite specimens of selected geometry and makeup to be described herein. Keywords: Laminate analysis, failure, finite element methods, internal state variables, plasticity.

DESCRIPTORS: (U) *FIBER REINFORCED COMPOSITES, *LAMINATES, COMPOSITE MATERIALS, FINITE ELEMENT ANALYSIS, PLASTIC PROPERTIES, STIFFNESS, DAMAGE, MEDIA, INTERNAL, MODELS, FAILURE(MECHANICS)

IDENTIFIERS: (U) WUAFOSR230282, PE61102F

IAC NO: PL-050235

AD-A175 017

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVJ56L

AD A175 017 CONTINUED

IAC DOCUMENT TYPE PLASTC MICROFICHE

IAC SUBJECT TERMS P (U)Finite element analysis, Damage, Strength analysis, Fiber fracture, Stiffness, Laminates, Matrix cracking, Graphite HAS4/epoxy 3502, Composites, Epoxy 3502, Transverse cracking, Radiography, Edge replication, Crack initiation, Fracture modes, R and D, Failure analysis, Plasticity, Elastic analysis, Stress analysis, Interface degradation, ZZ Unlimited.

AD-A175 015 20 5/0

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Combined Polynomial and Near-Dissociation Representations for Diatomic Spectral Data: Cl2(X) and I2(X).

86 16P

PERSONAL AUTHORS: Ashmore,J. G. ;Tellinghuisen,Joel ;

CONTRACT NO. AFOSR-83-0110

PROJECT NO 2303

TASK NO. B1

MONITOR: AFOSR
TR-86-2101

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Spectroscopy, v119 p68-82 1986.

ABSTRACT: (U) Fluorescence data which sample virtually the entire ground state potential wells for Cl2 and I2 are least-squares analyzed in terms of mixed representations-polynomials in v + 1/2 at low v and near-dissociation expansions at high v. Smooth functional expressions for the vibrational energy and rotational constant are obtained by means of exact constraints introduced into the fits by Lagrange's method of undetermined multipliers. The resulting least-squares equations are less illconditioned than those often encountered in fitting to high-order polyomials, and the smoothness constraints are satisfied with negligible statistical penalty. The results of the fits are examined for their extrapolating ability and their sensitivity to changes in the orders of the component functions and in the low-v to high-v switchover point.

DESCRIPTORS: (U) *FLUORESCENCE, *DIATOMIC MOLECULES, *PHOTODISSOCIATION, *IODINE, *CHLORINE, CONSTANTS, ENERGY, EQUATIONS, FITTINGS, FUNCTIONS, GROUND STATE, LAGRANGIAN FUNCTIONS, PENALTIES, POLYNOMIALS, ROTATION, SPECTRA, STATISTICS, VIBRATION, REPRINTS

IDENTIFIERS: (U) Lagrangian Multipliers, WUAFOSR2303B1.

AD-A175 015

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 014 CONTINUED

AD-A175 014 .14 2/0.20 6/0

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MATERIALS ENGINEERING

(U) Acquisition of an Analytical Electron Microscopy Facility.

DESCRIPTIVE NOTE: Final technical rept. 14 Dec 84-13 Dec 85,

MAR 86 7P

PERSONAL AUTHORS: Duquette,D. J. ;

REPORT NO. 1

CONTRACT NO. AFOSR-85-0040

PROJECT NO. 2917

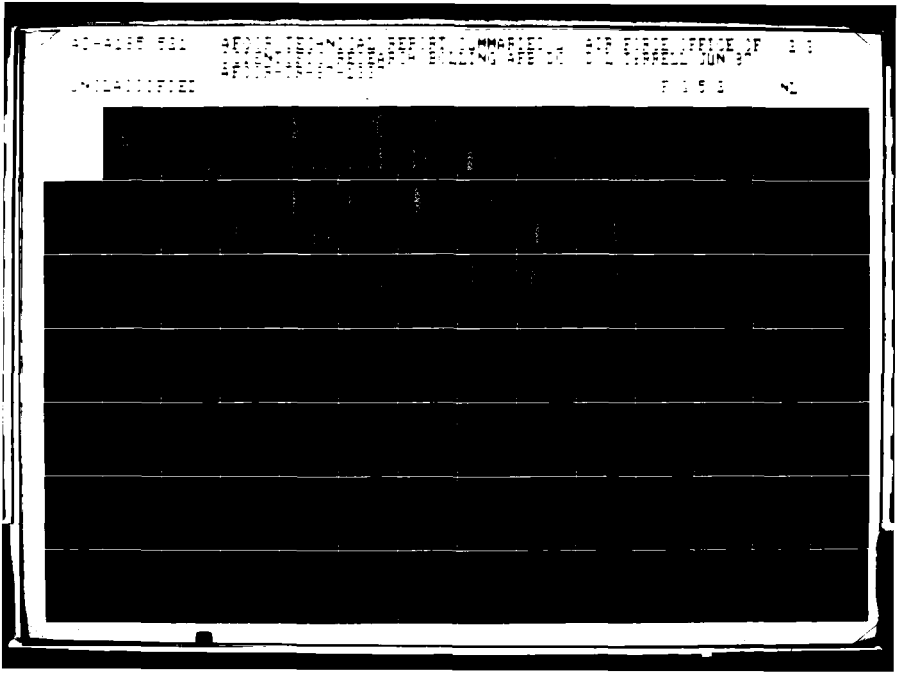
TASK NO. A3

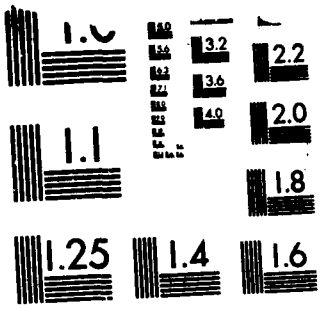
MONITOR: AFOSR TR-86-2092

UNCLASSIFIED REPORT

ABSTRACT: (U) Reports the acquisition of an electron microscope facility and X-Ray Analyzer for materials analysis, and X-Ray Analyzers.

DESCRIPTORS: (U) *X RAY APPARATUS, *ELECTRON MICROSCOPES, ACQUISITION, FACILITIES, ELECTRON MICROSCOPY, ANALYZERS, LABORATORY EQUIPMENT, GONIOMETERS





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 011 .20 S/O

SAN DIEGO STATE UNIV CA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Electron Production, Electron Attachment, and Charge Recombination Process in High Pressure Gas Discharges.

DESCRIPTIVE NOTE: Final rept. 1 Aug 85-31 Jul 86,

SEP 86 40P

PERSONAL AUTHORS: Lee,Long C. ;Wang,Wen C. ;

CONTRACT NO. AFOSR-82-0314

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-86-2178

UNCLASSIFIED REPORT

ABSTRACT: (U) The electron attachment rate constants of SO2, CS2, and SOC12 in buffer gases of Ar, N2, and CH4 were measured at various E/N by a parallel plate drift tube electron swarm technique. The initial electron swarm was produced by irradiation of cathode with excimer laser. The electron attachment processes for the electronegative gases studied were investigated. The transient increase of electron conduction current by photoelectron detachment of negative ions in the discharge medium of SOC12 in N2 was observed. This switching is useful for the development of opening switches. Keywords: Electron production; Electron attachment; Electron diffusion; Charge recombination; Electron conduction current; Negative ion; Electron swarm; Electrical discharge; Opening switches; Electron attaching gas; Excimer laser; Parallel-plate drift-tube apparatus; Computer modeling.

DESCRIPTORS: (U) *RECOMBINATION REACTIONS, *ELECTRON TRANSFER, *GAS DISCHARGES, BUFFERS, GASES, OPENING(PROCESS), ELECTRONS, ATTACHMENT, DIFFUSION, HIGH PRESSURE, COMPUTERIZED SIMULATION, CONDUCTIVITY, ELECTRIC CURRENT, PRODUCTION, EXCIMERS, CATHODES, IRRADIATION, EXCITATION, LASER PUMPING, DRIFT TUBE MASS SPECTROSCOPY, SULFUR OXIDES, CARBON DISULFIDE, THIONYL CHLORIDE, ARGON, NITROGEN, METHANE, ELECTRONIC SWITCHES, ANIONS

AD-A175 011

AD-A175 011 CONTINUED

IDENTIFIERS: (U) MUAFOSR2301A7, PE61102F

AD-A175 011

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 010 .20 4/0

SAN DIEGO STATE UNIV CA DEPT OF AEROSPACE ENGINEERING AND ENGINEERING MECHANICS

(U) Three-Dimensional Laminar Boundary Layers.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 81-31 Dec 84,

FEB 85 4P

PERSONAL AUTHORS: Wang,K. C. ;

CONTRACT NO. AFOSR-81-0109

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2150

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Continuation of Contracts F49620-70-C-0085 and F49620-76-C-0004.

ABSTRACT: (U) This grant, devoted to the subject of laminar flows in three dimensions. During this period, efforts were first focused on settling the fundamental question of three dimensional separation. New evidences continue to lend support to our open separation concept. Later emphasis was shifted to the preparation of a monograph to bring together the newly developed materials on the subject of three dimensional laminar flows into a unified treatment.

DESCRIPTORS: (U) *FLOW SEPARATION, *THREE DIMENSIONAL FLOW, *LAMINAR BOUNDARY LAYER, SEPARATION, LAMINAR FLOW, THREE DIMENSIONAL

IDENTIFIERS: (U) WUAFOSR2307A1, PE61102F

AD-A175 010

AD-A175 008 .12 3/0

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) A Note on Merton's Optimum Consumption and Portfolio Rules in a Continuous-Time Model. Revised.

DESCRIPTIVE NOTE: Technical rept.,

MAY 86 11P

PERSONAL AUTHORS: Sethi,Suresh P. ;Taksar,Michael ;

REPORT NO. FSU-STATISTICS-M745, TR-86-197-AFOSR

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2146

UNCLASSIFIED REPORT

ABSTRACT: (U) In the area of consumption and portfolio problem in continuous time, Merton is the most widely cited paper. It is an important paper because of its many significant contributions. Among these was the provision of explicit solutions for utility functions in the HARA family specified in equation (43) of Merton's paper. These solutions in the form of lengthy formulas were simply stated without any derivation. Perhaps, because of this, some errors went undetected. While some minor errors were corrected in Merton, the purpose of this not is to delineate the subfamily of HARA utility functions for which the explicit solution obtained in Section 6 of Merton's paper are correct and the remaining subfamily for which they are not.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *ECONOMIC MODELS, CONSUMPTION, EQUATIONS, UTILIZATION, TIME, OPTIMIZATION, STOCHASTIC PROCESSES

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A175 008

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 006 .20 4/0

TORONTO UNIV DOWNSVIEW (ONTARIO) INST FOR AEROSPACE STUDIES

(U) Asymptotic Solutions to Compressible Laminar Boundary-Layer Solutions for Dusty-Gas Flow over a Semi-Infinite Flat Plate.

DESCRIPTIVE NOTE: Interim rept.,

AUG 86 87P

PERSONAL AUTHORS: Wang,B. Y. ;Glass,I. I. ;

REPORT NO. UTIAS-310

CONTRACT NO. AFOSR-82-0066

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2165

UNCLASSIFIED REPORT

ABSTRACT: (U) An asymptotic analysis is given of the compressible, laminar boundary layer flow of a dilute gas particle mixture over a semi-infinite flat plate. The analysis extends existing work by considering more realistic drag and heat transfer relations than those provided by Stokes. A more general viscosity temperature expression is also incorporated into the analysis. The solution involves a series expansion in terms of the slip parameter of the particles. The numerical results, including the zeroth and first order approximations for the gas and particle phases, are presented for the two limiting regimes: the large slip limit near the leading edge and the small slip limit far downstream. Significant effects on the flow produced by the particles with Stokes' and non-stokes' relations are studied and clarified. The effects of some nondimensional similarity parameters, such as the Reynolds, Prandtl and Eckert numbers, on the two phase boundary layer flow are discussed. Keywords: Dusty gas flows; Two phase flows; Boundary layer flows; Partial differential equations; Numerical analysis; Canada.

AD-A175 006 CONTINUED

DESCRIPTORS: (U) *FLAT PLATE MODELS, *TWO PHASE FLOW, *BOUNDARY LAYER FLOW, ASYMPTOTIC SERIES, COMPRESSION, LAMINAR BOUNDARY LAYER, SOLUTIONS(GENERAL), DRAG, HEAT TRANSFER, NUMERICAL ANALYSIS, DILUTION, GASES, MIXTURES, PARTICLES, DUST, GAS FLOW, LEADING EDGES, PARTIAL DIFFERENTIAL EQUATIONS, LAMINAR FLOW, PHASE, LIMITATIONS, EXPANSION, SERIES(MATHEMATICS), CANADA, APPROXIMATION(MATHEMATICS)

IDENTIFIERS: (U) WUAFOSR2307A1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ66L

AD-A175 005 .12 3/0.13 8/0

STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF APPLIED MATHEMATICS AND STATISTICS

(U) Continuum Structure Functions.

DESCRIPTIVE NOTE: Final rept. 22 Jul 83-23 Jul 84,

JUL 84 14P

PERSONAL AUTHORS: Baxter,Laurence A. ;

CONTRACT NO. AFOSR-84-0243

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR TR-86-2191

UNCLASSIFIED REPORT

ABSTRACT: (U) A continuum structure function is a nondecreasing mapping from the unit hypercube to the unit interval. The theory of such functions generalizes the traditional theory of binary and multistate structure functions, permitting more realistic and flexible modelling of systems subject to reliability growth, component degradation and partial availability. A theory of modules (i.e. subsystems) was developed and, various sets of bounds were calculated on the distribution of the structure function when the component states are random variables. Axiomatic characterizations of two important special cases are deduced a definition derived of the reliability importance of the various components, a theory of cannibalization deduced.

DESCRIPTORS: (U) *MAPPING(TRANSFORMATIONS), *STATISTICAL ANALYSIS, *RELIABILITY, DEGRADATION, CONTINUUM MECHANICS, RANDOM VARIABLES, FUNCTIONS, STRUCTURAL PROPERTIES, SPARE PARTS, THEORY, GROWTH(GENERAL), INTERVALS

IDENTIFIERS: (U) Hypercubes, Structure functions, MUAFOSR2304A7, PE61103F

AD-A175 005

AD-A175 004 .11 4/0.14 2/0

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS CENTER

(U) Research on Characterization of Damage States in Continuous Fiber Composites Using Ultrasonic Nondestructive Evaluation.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 85-31 Jan 86,

MAY 86 140P

PERSONAL AUTHORS: Kinra,Vikram K. ;

REPORT NO. MM-5024-86-12

CONTRACT NO. AFOSR-84-0088

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR TR-86-2182

UNCLASSIFIED REPORT

ABSTRACT: (U) It is well know that composite materials suffer complex damage when they are subjected to either monotonic or fatigue loading. This damage affects both the velocity and attenuation of ultrasonic waves. The primary objective of this research is to correlate the damage states with the changes in the velocity and attenuation. Once this has been accomplished the pair of ultrasonic parameters becomes a measure of the damage. A particular damage mode, namely, transverse cracking has been examined in detail. The Through-the-thickness attenuation was found to be a very sensitive measure of transverse cracking. In order to study the influence of damage axial stiffness, we have studied the propagation of Lesky-Lamb waves. As expected the transverse cracking significantly reduces the axial stiffness. Finally, a new experimental technique for measuring speed and attenuation of ultrasonic waves in laminates of very small thickness has been developed. Key Words: Ultrasonic nondestructive testing, Lamb waves.

DESCRIPTORS: (U) *FIBER REINFORCED COMPOSITES,

AD-A175 004

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A175 004 CONTINUED

ATTENUATION, DAMAGE, PARAMETERS, ULTRASONICS, CRACKS, COMPOSITE MATERIALS, AXES, STIFFNESS, LAMINATES, MEASUREMENT, VELOCITY, THICKNESS, NONDESTRUCTIVE TESTING, WAVE PROPAGATION, ULTRASONIC TESTS, SENSITIVITY

IDENTIFIERS: (U) NUAFOSR230282, PE61102F

IAC NO. NT-035890 PL-050243

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --
PLASTC - MICROFICHE --

IAC SUBJECT TERMS: P--(U)NDT, NDE, Ultrasonics, Characterization, Damage assessment, Transverse cracking, Wave propagation, Attenuation, Laminates, R and D, Filament wound structures, Crack growth, Graphite fiber/epoxy, Transverse cracking, Stress waves, Stiffness, Lamb wave test, Fatigue, Composites, ZZ Unlimited.; n--(u) composite materials, ultrasonic testing, damage, lamb waves, stiffness, laminates, thinness, wave propagation, technique, development, fiber reinforced composites, detection;

AD-A175 002 .20 11/0.22 2/0

CLARKSON UNIV POTSDAM NY DEPT OF MECHANICAL AND INDUSTRIAL ENGINEERING

(U) Nonlinear Analysis and Optimal Design of Dynamic Mechanical Systems for Spacecraft Application.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 85-31 Jan 86.

FEB 86 37P

PERSONAL AUTHORS: Wilmert,K. D. ;Sathyamoorthy,M. ;

CONTRACT NO. AFOSR-84-0078

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-2112

UNCLASSIFIED REPORT

ABSTRACT: (U) A nonlinear finite element analysis procedure already developed for planar mechanisms is being modified to handle complex mechanisms with sliding masses and mechanisms operating at relatively high speeds. Progress is also being made in developing a suitable nonlinear finite element analysis procedure for three-dimensional mechanisms. In both cases the analysis takes into account the effects of geometric and material nonlinearities, vibrational effects and coupling of deformations. In the optimal design area, a new algorithm has been developed for finding the minimum of a sum-of-squares objective function subject to general nonlinear constraints. The solution of preliminary examples indicate good results in terms of the total number of objective function evaluations to obtain an optimal design. Complete details of these investigations are included in the Appendix. To meet the extraordinary computational needs of this project, a separate research VAX 11/785 Computer and peripheral equipment were made available through a DoD research grant. The National Science Foundation also provided funds for some additional equipment as well as computational time on a supercomputer.

AD-A175 004

AD-A175 002

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A175 002 CONTINUED

DESCRIPTORS: (U) *NONLINEAR ANALYSIS, *FINITE ELEMENT ANALYSIS, *COMPUTER AIDED DESIGN, *SPACECRAFT, *VIBRATION, NONLINEAR SYSTEMS, FUNCTIONS, SLIDING, MASS, FUNCTIONS(MATHEMATICS), SPACECRAFT COMPONENTS, SPATIAL DISTRIBUTION, ALGORITHMS, COMPUTATIONS, COUPLING(INTERACTION), DEFORMATION, DYNAMICS, HIGH VELOCITY, MATERIALS, MECHANICAL COMPONENTS, OPTIMIZATION, PLANAR STRUCTURES, TEST AND EVALUATION, THREE DIMENSIONAL, TIME, DYNAMIC RESPONSE, GEOMETRY

IDENTIFIERS: (U) WUAFOSR2302B1, PE61102F

AD-A174 999 .14 3/0

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) High Density Ion Implanted Contiguous Disk Bubble . Technology.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 84-29 Sep 85,

SEP 85 27P

PERSONAL AUTHORS: Kryder,M. H. ;

CONTRACT NO. AFOSR-84-0341

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR TR-86-2210

UNCLASSIFIED REPORT

ABSTRACT: (U) Ion implanted contiguous disk bubble memory devices, which were designed and fabricated are being tested. The aim of this testing is to identify the strongest and the weakest elements of these circuits with the hope of designing a fully operational four micron period device. The initial phase of testing has involved obtaining minor loop propagation bias margins, observing the failure mechanisms and attempting to discover the reasons for these failure. Future work will include similar observation for generation, transfer and detection including both bias and current amplitude and phase margins.

DESCRIPTORS: (U) *DETECTION, *BUBBLE MEMORIES, *IONS, *MAGNETIC DISKS, *MEMORY DEVICES, DISKS, HIGH DENSITY, FAILURE, TEST METHODS

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1

AD-A174 995 .12 3/0

ARIZONA UNIV TUCSON APPLIED MATHEMATICS PROGRAM

(U) Markovian Shock Models, Deterioration Processes, Stratified Markov Processes and Replacement Policies.

DESCRIPTIVE NOTE: Final rept. 15 Aug 84-14 Aug 85,

MAY 86 21P

PERSONAL AUTHORS: Newell,Alan ;

CONTRACT NO. AFOSR-84-0256

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR TR-86-2189

UNCLASSIFIED REPORT

ABSTRACT: (U) A list of 37 papers written on research using a VAX 11/750 purchased with funds from AFOSR-84-0256. Research was mainly directed toward numerical solutions of differential equations.

DESCRIPTORS: (U) *MARKOV PROCESSES, MATHEMATICAL MODELS, COMPUTER APPLICATIONS, TRAVELING WAVES, SCHRODINGER EQUATION, OPTICAL WAVEGUIDES, DETERIORATION, SHOCK, POLICIES, REPLACEMENT, DIFFERENTIAL EQUATIONS, NUMERICAL ANALYSIS, SOLUTIONS(GENERAL), STRATIFICATION

IDENTIFIERS: (U) VAX-11/750 computers, Nonlinear optics, PE61102F, WUAFOSR2917A5

AD-A174 995

AD-A174 992 .20 8/0

CALIFORNIA UNIV RIVERSIDE DEPT OF PHYSICS

(U) International Symposium on Correlation and Polarization in Electron-Atom Collisions Held in Pasadena, California on 1-2 August 1985.

DESCRIPTIVE NOTE: Final rept. 1 Jun 85-31 May 86,

AUG 85 33P

PERSONAL AUTHORS: Nickel,John C. ;

CONTRACT NO. AFOSR-85-0225

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR TR-86-2120

UNCLASSIFIED REPORT

ABSTRACT: (U) Program Abstracts: What we have learned from e-gamma-coincidence experiments; Time development of Stark Mixed Atomic Hydrogen States; Polarized electron-polarized atom collisions; Polarization in electron collisions with heavy atoms; Elastic Scattering of polarized electrons from Mercury and Xenon for complete Evaluation of scattering amplitudes; The three body interaction with long range forces: Spin tagged electron atomic hydrogen scattering; Correlation in electron sodium scattering; Electron atom collision studies using optically state selected beams; anomalous effects in very small angle electron potassium differential scattering measurements; Alignment and Orientation in Collision Processes - What we have learned so far; Electron scattering on Heavy Atoms; Electron photon Angular Correlation parameters; Electron photon coincidence Experiments using molecular Targets; Some Physics with state selected sodium beams; Coherence and correlations in electron collisions with metal vapors; Application of stepwise excitation techniques to polarization correlation and super elastic scattering studies of electron-atom collisions.

DESCRIPTORS: (U) *PARTICLE COLLISIONS, *ELECTRON SCATTERING, STARK EFFECT, HYDROGEN, MOLECULES, COLLISIONS,

AD-A174 992

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 992 CONTINUED

DIFFERENTIAL CROSS SECTIONS, ANOMALIES, ELASTIC SCATTERING, ELECTRONS, SODIUM, EXCITATION, CORRELATION, SYMPOSIA, MERCURY, METAL VAPORS, PHYSICS, POLARIZATION, ABSTRACTS, BODIES, INTERACTIONS, TARGETS, XENON

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4

AD-A174 991 .11 4/0.11 6/0.20 12/0

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING

(U) Analytical and Experimental Characterization of Damage Processes in Composite Laminates.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 84-29 Sep 85,

MAY 86 54P

PERSONAL AUTHORS: Dvorak,George J. ;Laws,Norman ;

REPORT NO. RPI-CECM-2

CONTRACT NO. AFOSR-84-0366

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR TR-86-2180

UNCLASSIFIED REPORT

ABSTRACT: (U) A summary of results is presented on the subject of damage development in metal and polymer matrix composite laminates. The following technical developments are described: (i) Evaluation of crack densities, stiffness changes, and fiber stresses caused by cyclic loading in three 6061-0 AlB laminates, with 08 (0/90)2s, and (o/+ or - 45/90/0 + or - 45/1/290s) layers. This problem is solved in an incremental way, with regard for interaction between plastic deformation and matrix crack growth in individual plies. Saturation damage states are predicted at different levels of steady cyclic loading. Good comparison is obtained with available experimental data, (ii) Analysis of first ply failure in polymer matrix composites. The influence of ply thickness on strength is predicted in terms of flaw nucleation mechanisms, and (iii) Analysis of distributed damage caused in a composite ply by either transverse cracks or fiber breaks. Several methods, such as self-consistent estimates, shear lag approximations, crack array models, and finite element analysis of cracks in an embedded ply were employed. It was found that these methods give very similar predictions of stiffness reductions of plies and laminates, and that these predictions are in good

AD-A174 991 CONTINUED

agreement with available experimental data.

DESCRIPTORS: (U) *METAL MATRIX COMPOSITES, *FATIGUE(MECHANICS), *LAMINATES, *POLYMERS, COMPOSITE MATERIALS, CRACKS, DENSITY, CYCLES, LOADS(FORCES), DAMAGE, DISTRIBUTION, FINITE ELEMENT ANALYSIS, DEFECTS(MATERIALS), NUCLEATION, ARRAYS, MODELS, FIBERS, STRESSES, LAYERS, PLASTIC DEFORMATION, MATRIX MATERIALS, APPROXIMATION(MATHEMATICS), DELAY, SHEAR PROPERTIES, REDUCTION, STIFFNESS, TRANSVERSE, CONSISTENCY, STEADY STATE, DAMAGE

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2

AD-A174 990 .11 6/1.20 11/0

BATTELLE PACIFIC NORTHWEST LAB RICHLAND WA

(U) Material Structure in Viscoplasticity: An Extension of Bodner's Theory.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 May 86,

JUL 86 61P

PERSONAL AUTHORS: Williford,R. E. ;

CONTRACT NO. F49620-85-C-0149

MONITOR: AFOSR TR-86-2125

UNCLASSIFIED REPORT

ABSTRACT: (U) Although Bodner's viscoplastic constitutive equation is useful because it does not require a yield criterion, it also exhibits deficiencies related to hardening behavior. Two new constitutive forms were developed from Bodner's equation to address this problem. The general approach employed scaling relations to define macrostructural response in terms of microstructural evolution. The first new equation expresses strain rate as a function of scaled microstructural models available from the metallurgical literature, and is useful for structural analyses. The second new equation represents a nonlocal model for viscoplasticity. It describes the evolution of internal stress field fluctuations in terms of scaled hardening and damage state variables, and contains the basis for a new material state tensor. The two new equations were verified by comparison to creep data for a steel alloy and aluminum, respectively. Keywords: Bodner's theory, Microstructure; Fractals; Scalings; Nonlocal stress polarizations.

DESCRIPTORS: (U) *STRAIN RATE, *VISCOPLASTIC PROPERTIES, POLARIZATION, STRESSES, ALLOYS, STEEL, STRUCTURAL ANALYSIS, EQUATIONS, EVOLUTION(GENERAL), MICROSTRUCTURE, ALUMINUM, DAMAGE, VARIABLES, MATERIALS, STRUCTURAL PROPERTIES, TENSORS, COMPARISON, CREEP, HARDENING, METALLURGY, STRUCTURAL RESPONSE, SCALING FACTORS, INTERNAL, MODELS

IDENTIFIERS: (U) Constitutive equations, Bodner

AD-A174 991

AD-A174 990

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 990 CONTINUED

equations, Fractals, Nonlocal stress polarizations, PE61102F, MUAFOSR2302B1

AD-A174 987 .1 5/0.13 2/0.13 13/0

ILLINOIS UNIV AT URBANA DEPT OF CIVIL ENGINEERING

(U) Three-Dimensional Finite Element Analysis of a Slab on Stress Dependent Elastic Solid Foundation.

DESCRIPTIVE NOTE: Final rept. 21 Aug 84-20 Jun 88,

OCT 88 201P

PERSONAL AUTHORS: Ioannides,A. M. ;Thompson,M. R. ; Donnelly,J. ;Barenberg,E. J. ;

CONTRACT NO. AFOSR-82-0143

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR TR-88-2108

UNCLASSIFIED REPORT

ABSTRACT: (U) This report examined current computerized analysis techniques for slabs on grade. The focus of investigations presented is the application of the three dimensional finite element program GEOSYS for the analysis of a slab, resting on a stress dependent elastic solid foundation. This model can be used to establish baseline structural response data, representative of complex boundary and support conditions, thereby validating conclusions reached on the basis of two dimensional analysis. Many computer runs were conducted to develop user guidelines for the fruitful utilization of the three dimensional approach. Effects considered include mesh fineness and gradation, subgrade extent, boundary conditions, etc. The three fundamental loading conditions, viz. interior, edge and corner, are examined. Two typical single and multi-wheel U.S. Air Force aircraft are employed (F-15 and C-141). Anm iterative scheme is introduced to account for subgrade stress dependence. The effect of stress softening, typical of cohesive soils, is evaluated and discussed. A number of interesting observations are made, and their bearing on current analysis and design approaches is considered. Two broad areas for future research are identified. The relevance and need of the GEOSYS model to future pavement research/development activities is established. Keywords:

AD-A174 990

AD-A174 987

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 987 CONTINUED

Runway Pavements; Slab Model.

DESCRIPTORS: (U) *FOUNDATIONS(STRUCTURES), *PAVEMENTS, *RUNWAYS, AIR FORCE EQUIPMENT, MILITARY AIRCRAFT, BOUNDARIES, MODELS, FINITE ELEMENT ANALYSIS, BASE LINES, STRUCTURAL RESPONSE, COHESION, SOILS, ITERATIONS, THREE DIMENSIONAL, TWO DIMENSIONAL, SOLIDS, ELASTIC PROPERTIES, COMPUTER PROGRAMS, LOAD DISTRIBUTION, STRESS ANALYSIS, SUPPORTS, INSTRUCTIONS, USER NEEDS

IDENTIFIERS: (U) Slab structures, GEOSYS computer program, Subgrade supports, PE61102F, WUAFOSR2307C1

AD-A174 985 .9 3/0

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Optically Pumped Short Wavelength Lasers.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 85,

AUG 85 7P

PERSONAL AUTHORS: Krishnan,Mahadevan ;

CONTRACT NO. AFOSR-84-0382

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-86-2188

UNCLASSIFIED REPORT

ABSTRACT: (U) All items of equipment were purchased during the period August, 1984 to August 1985. In August, 1985, the Principal Investigator, M. Krishana, left Yale University for Physics International Co. (PI). At PI, he is pursuing pulsed power driven x-ray lasers. The equipment acquired at Yale remains uncrated and unused, because of the departure of M. Krishnan and because of the termination of the research Grant (81-0077) on January 31st, 1986.

DESCRIPTORS: (U) *TEA LASERS, *LASER COMPONENTS, OPTICAL PUMPING, X RAYS, RESEARCH MANAGEMENT

IDENTIFIERS: (U) *X ray lasers, PE61102F, WUAFOSR2301A8

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 984 .7 1/0.12 3/0.21 2/0

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.

DESCRIPTIVE NOTE: Annual rept. 10 Sep 85-31 Aug 86,

OCT 86 90P

PERSONAL AUTHORS: Dryer,F. L. ;Rabitz,H. ;Yetter,R. ;

CONTRACT NO. AFOSR-85-0346

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-2106

UNCLASSIFIED REPORT

ABSTRACT: (U) This program dealt with the development and application of new approaches for producing and evaluating semi-empirical (lumped parameter) mathematical models of physical processes. Procedures using local sensitivity gradient methods were used to study the existing lumped kinetic models for the moist carbon monoxide oxidation to show that transport processes can cause oversimplified lumped models derived from homogeneous kinetics to fail when applied to flame propagation systems. New models are under development which will include the appropriate level of detail. A Lie group formalism was developed to address global parameter space mapping issues for first order differential equations. Keywords: Lie Algebra.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *COMBUSTION, *CARBON MONOXIDE, *COMBUSTION CHAMBERS, *EXPERIMENTAL DESIGN, ALGEBRA, DIFFERENTIAL EQUATIONS, FLAME PROPAGATION, GLOBAL, HOMOGENEITY, KINETICS, LIE GROUPS, MOISTURE, OXIDATION, PARAMETERS, TRANSPORT PROPERTIES

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2

AD-A174 984

AD-A174 983 .6 1/0.12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) Variance Functions and the Minimum Detectable Concentration in Assays.

DESCRIPTIVE NOTE: Technical rept. Aug 85-Aug 86,

JUL 86 36P

PERSONAL AUTHORS: Carroll,R. J. ;Davidian,M. ;Smith,W. ;

REPORT NO. MIMEO-SER-1701

CONTRACT NO. F49620-82-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2166

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Eli Lilly & Company.

ABSTRACT: (U) Assay data are often fit by a nonlinear regression model incorporating heterogeneity of variance, as ion radioimmunoassay, for example. Typically, the standard deviation of the response is taken to be proportional to a power theta of the mean. There is considerable empirical evidence suggesting that for assays of a reseasonable size, how one estimates the parameter thata does not greatly affect how well one estimates the the mean regression function. An additional component of assay analysis is the estimation of auxillary constructs such as the minimum detectable concentration, for which many definitions exist; we focus on one such definition. The minimum detectable concentration depends both on theta and the mean regression function. We compare three standard method of estimating the parameter theta due to Rodbard (1978), Raab (1981a) and Carroll and Ruppert (1982b). When duplicate counts are taken at each concentration, the first method is only 20% efficient asymptotically in comparison to the third, and the resulting estimate of the minimum detectable concentration is asymptotically 3.

AD-A174 983

AD-A174 983 CONTINUED

3 times more variable for first than the third. Less dramatic results obtain for the second estimator compared to the third; this estimator is still not efficient, however. Simulation results and an example are supportive of the asymptotic theory. Keywords: Least squares method.

DESCRIPTORS: (U) *BIOASSAY, *ANALYSIS OF VARIANCE, *CONCENTRATION(CHEMISTRY), *LEAST SQUARES METHOD, *REGRESSION ANALYSIS, STANDARD DEVIATION, FUNCTIONS, VARIATIONS, STANDARDIZATION, ESTIMATES, ASSAYING, HETEROGENEITY, MATHEMATICAL MODELS, NONLINEAR ANALYSIS, ESTIMATES, ASYMPTOTIC SERIES, COUNTING METHODS, IONS, RADIOIMMUNOASSAY, MEAN, SIMULATION

IDENTIFIERS: (U) Heteroscelasticity

AD-A174 970 .20 5/0.20 9/0

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA

(U) Plasma Deposition of Silicon Carbide Thin Films.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Jul 84-30 Jun 86,

JUL 86 91P

PERSONAL AUTHORS: Partlow,W. D. ;Choyke,W. J. ;Yates,John T. , Jr.;Kline,L. E. ;Bozack,M. J. ;

CONTRACT NO. F49620-84-0063

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-86-2038

UNCLASSIFIED REPORT

ABSTRACT: (U) In the plasma studies area, the model for carbon deposition from methane plasmas was extended to include homogeneous chemical kinetics of both neutral and ionized species, and it was tested with extensive plasma characterization experiments varying plasma excitation and flow parameters. In addition, experiments were completed on methane-hydrogen plasmas, and will be compared to the model. Thermal desorption and dissociation kinetic studies of propylene on silicon surfaces has produced several significant results. It was found that surface reactivity could be controlled by creating damage sites via ion bombardment or by capping such sites with atomic hydrogen. In addition, the adsorption of propane and methane were studied at 120K and compared to the double-bonded propylene using kinetic uptake experiments and Auger surface studies. It was found that no sticking is obtained for hydrocarbon molecules that do not have C=C double bonds. This program has produced several journal articles as well as numerous invited and contributed conference talks and papers. Four preprints are attached which describe the main accomplishments of this program during this reporting period.

DESCRIPTORS: (U) *VAPOR DEPOSITION, *CARBON, *SILICON

AD-A174 970

AD-A174 970 CONTINUED

CARBIDES, *THIN FILMS, *PLASMAS(PHYSICS), IONIZATION, NEUTRAL, SILICON, SURFACES, DESORPTION, THERMAL RADIATION, REACTIVITIES, ADSORPTION, PROPANE, AUGER ELECTRONS, DAMAGE, SITES, FLOW, PARAMETERS, HYDROCARBONS, MOLECULES, METHANE, HYDROGEN, CAPPING, KINETICS, DISSOCIATION, REACTION KINETICS, ION BOMBARDMENT

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1

AD-A174 968 .20 4/0

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Computation of three Dimensional Viscous Compressible Flow at Hypersonic Velocity.

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-30 Sep 86,

SEP 86 36P

PERSONAL AUTHORS: Candler,Graham V. ;MacCormack,Robert W. ;

CONTRACT NO. AFOSR-85-0372

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2098

UNCLASSIFIED REPORT

ABSTRACT: (U) A numerical method to solve the perfect gas Navier-Stokes equations for hypersonic flows past three-dimensional blunt bodies has been developed. The numerical method uses flux-splitting and shock-fitting with an implicit Gauss-Seidel line-relaxation procedure to accelerate convergence. The technique has been used to solve the flow field over a spherically blunted biconic and the X24C-10D hypersonic research vehicle. The method has been shown to reduce the number of iterations required to achieve convergence of a typical problem by a factor of about one hundred over an explicit method. The scheme also shows a potential advantage over approximately factored implicit methods. The key advantage of this technique is that the low number of iterations required for convergence does not increase as mesh resolution is refined. Keywords: Hypersonic vehicles; Algorithms; Numerical methods and procedures; Three dimensional flow; Viscous flow; Compressible flow.

DESCRIPTORS: (U) *SHOCK WAVES, *COMPRESSIBLE FLOW, *HYPERSONIC VELOCITY, ALGORITHMS, FLOW FIELDS, HYPERSONIC FLOW, ITERATIONS, NUMERICAL METHODS AND PROCEDURES, BLUNT BODIES, STRUCTURES, GASES, NAVIER STOKES EQUATIONS, *HYPERSONIC VEHICLES*, *THREE DIMENSIONAL FLOW*, VISCOUS FLOW, DATA REDUCTION, GRAPHS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 968 CONTINUED

IDENTIFIERS: (U) Gauss seidel line relaxation, PE61102F, WUAFOSR2307A1

AD-A174 967 .20 4/0.21 2/0

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL ENGINEERING

(U) Numerical Simulation of Turbulent Flames Using Vortex Methods.

DESCRIPTIVE NOTE: Annual progress rept. no. 2, 1 Sep 85-31 Aug 86,

OCT 86 38P

PERSONAL AUTHORS: Ghoniem,Ahmed F. ;

CONTRACT NO. AFOSR-84-0356

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-2097

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this research is to develop vortex methods for numerical simulation of multi-dimensional, time-dependent turbulent chemically-reacting flows with high temporal and spatial accuracy. Of particular interest is turbulent shear flows associated with the propagation of turbulent flames in combustion systems. Vortex methods are developed and incorporated in a numerical simulations of turbulent reacting flow, and applied to study the propagation and stability of turbulent flames in different geometrical configurations. At high Damkohler number, a dynamic thin flame model is used, while for slower reactions, the vortex scheme is extended to solve the energy and species equations with finite rate chemical reaction in a Lagrangian particle form. Results have been obtained for a confined mixing layer, a recirculating flow over a rearward facing step, and a confined shallow cavity. Detailed analyses have been performed to validate the numerical schemes and to study the structure and stability of these flows. The scheme has been extended to three dimension flow and an investigation of the transition to turbulence in an axisymmetric shear layer has been initiated. Currently, the combustion algorithms. Are being linked to the vortex simulation to predict the interaction between the

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJS6L

AD-A174 967 CONTINUED

turbulent field and the burning process. Keywords: Turbulent combustion.

DESCRIPTORS: (U) *FLAME PROPAGATION, *COMBUSTION, *TURBULENT FLOW, *VORTICES, NUMERICAL ANALYSIS, FLOW, RECIRCULATION, EQUATIONS, TURBULENCE, SHEAR PROPERTIES, SIMULATION, VORTICES, PARTICLES, ACCURACY, SPATIAL DISTRIBUTION, FLAMES, STABILITY, TRANSITIONS, AXISYMMETRIC, LAYERS, CONFINEMENT(GENERAL), MIXING, THINNESS, CAVITIES, SHALLOW DEPTH, HIGH RATE, CHEMICAL REACTIONS, REACTION KINETICS, COMBUSTION STABILITY, TIME DEPENDENCE, THREE DIMENSIONAL FLOW, ALGORITHMS

IDENTIFIERS: (U) Turbulent combustion, Shear flow

AD-A174 967

AD-A174 983 .12 1/0

WASHINGTON UNIV ST LOUIS MO DEPT OF SYSTEMS SCIENCE AND MATHEMATICS

(U) The p-Version of the Finite Element Method,

DEC 85 26P

PERSONAL AUTHORS: Katz,I. N. ;Wang,Douglas W. ;

CONTRACT NO. AFOSR-77-1322

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-86-2074

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. on Numerical Analysis, v22 n6 p1082-1106 Dec 85.

ABSTRACT: (U) In the p-version of the finite element method, the triangulation of the domain is fixed and the degree p of the local approximating polynomial is increased. This is in contrast with the h-version in which the degree p is fixed and the maximum diameter h of all triangles is allowed to go to zero. We derive a convergence result for the approximating solution to the biharmonic equation when using the p-version. This result shows that the rate of convergence for the p-version with quasi-uniform mesh in the approximation of singular solutions caused by corners. This result which applies to problems which require C sub 1 global continuity is analogous to an earlier result which applied to C sub 0 problems. Applications to several benchmark problems in plate bending are presented. Sample results are examined and compared with theoretical predictions. (Author)

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, BIHARMONIC FUNCTIONS, CONVERGENCE, EQUATIONS, POLYNOMIALS, PREDICTIONS, RATES, SOLUTIONS(GENERAL), THEORY, TRIANGULATION, REPRINTS

IDENTIFIERS: (U) Biharmonic equations, PE61103F, WUAFOSR2304A3

AD-A174 983

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ88L

AD-A174 982 .14 2/0.20 4/0

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Dynamic Stall Penetration Experiments on a Swept Wing.

DESCRIPTIVE NOTE: Annual technical rept. no. 2, 15 Aug 85-15 Aug 86,

SEP 86 21P

PERSONAL AUTHORS: Carta,Franklin O. ;Lorber,Peter F. ;

CONTRACT NO. F49620-84-C-0062

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2208

UNCLASSIFIED REPORT

ABSTRACT: (U) An experiment was conducted to study the aerodynamic response of a wing to large amplitude pitching motions, including dynamic stall. A two-dimensional model was tested at Mach numbers of 0.2, 0.3, and 0.4, corresponding to Reynolds numbers between 2 x 1000000 and 4 x 1000000. A total of 49 unsteady conditions were studied, including both sinusoidal oscillations and constant pitch rate ramps. The ramp motions ranged up to 0 to 30 deg at pitch rates between 17.5 and 350 deg/sec. A preliminary analysis of the results shows significant effects of pitch rate and Mach number on the surface pressures, integrated airloads, and locations of boundary layer transition and separation. A pressure oscillation was detected in the post stall region that appears to result from periodic vortex shedding that has synchronized to the imposed pitching motion. A more detailed analysis of these results will be conducted during the remainder of this activity. Keywords: Unsteady aerodynamics; Dynamic stall; Aerodynamic testing; Unsteady measurement techniques.

DESCRIPTORS: (U) *STALLING, *PITCH(MOTION), *SWEPT WINGS, AERODYNAMIC CHARACTERISTICS, AERODYNAMIC LOADING, AMPLITUDE, BOUNDARY LAYER TRANSITION, CONSTANTS, DYNAMICS, INTEGRATED SYSTEMS, MACH NUMBER, MODELS, MOTION, OSCILLATION, PRESSURE, RAMPS, RATES, RESPONSE, REYNOLDS

AD-A174 982

AD-A174 982 CONTINUED

NUMBER, SURFACE PROPERTIES, TEST METHODS, TWO DIMENSIONAL, UNSTEADY FLOW, VORTEX SHEDDING, WINGS, BOUNDARY LAYER, SEPARATION, VARIABLE PRESSURE, PENETRATION, SUBSONIC CHARACTERISTICS, PRESSURE MEASUREMENT

IDENTIFIERS: (U) Unsteady aerodynamics, Dynamic stall, Boundary layer separation, PE61102F, WUAFOSR2307A1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 961 .12 3/0.13 8/0

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) Variance Function Estimation.

DESCRIPTIVE NOTE: Technical rept. Aug 85-Aug 86,

JUL 86 35P

PERSONAL AUTHORS: Davidian,Marie ;Carroll,Raymond ;

REPORT NO. MIMEO SER-1700

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2145

UNCLASSIFIED REPORT

ABSTRACT: (U) This document develops a general theory for variance function estimation in regression. Most methods in common use are included in our development. The general qualitative conclusions are these. First, most variance function estimation procedures can be looked upon as regressions with responses being transformation of absolute residuals from a preliminary fit or sample standard deviations fom replicates at a design point. Our conclusion is that the former is typically more efficient, but not uniformly so. Secondly, for variance function estimates based on transformations of absolute residuals, we show that efficiency is a monotone function of the efficiency of the fit from which the residuals are formed, at least for symmetric errors. Our conclusion is that one should iterate so that the residuals are based on generalized least squares. Finally, robustness issues are of even more importance here than in estimation of a regression function for the mean. The loss of efficiency of the standard method away from the normal distribution is much more rapid than in the regression problem. Keywords: quality control; heteroscedasticity.

DESCRIPTORS: (U) *QUALITY CONTROL, *REGRESSION ANALYSIS, *ANALYSIS OF VARIANCE, FITTING FUNCTIONS(MATHEMATICS),

AD-A174 961

AD-A174 961 CONTINUED

ERRORS, ESTIMATES, FUNCTIONS, LEAST SQUARES METHOD, MONOTONE FUNCTIONS, NORMAL DISTRIBUTION, RESIDUALS, STANDARD DEVIATION, STANDARDIZATION, SYMMETRY, TRANSFORMATIONS, VARIATIONS

IDENTIFIERS: (U) Heteroscedasticity, PE61102F, WUAFOSR2304A5

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJS6L

AD-A174 958 .20 4/0

PEDA CORP PALO ALTO CA

(U) Closing Developments in Aerodynamic Simulation with Disjoint Patched Meshes.

DESCRIPTIVE NOTE: Annual technical rept. 15 May 83-14 May 84,

AUG 86 38P

PERSONAL AUTHORS: Lombard,Charles K. ;

CONTRACT NO. F49620-83-C-0084

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-86-2186

UNCLASSIFIED REPORT

ABSTRACT: (U) This research has aimed at providing computational tools and procedures as the building blocks for a system to permit efficient solution and high resolution capture of flow structure in gas dynamic problems of realistically complex geometries. The research yielded a comparatively simple algebraic procedure for constructing two dimensional geometry fitted base level composite meshes in quadrilateral patches. The method provides complete control of coordinate distribution and gradient on all patch boundaries which may include slope discontinuties. A robust upwind implicit method (CSCM) was the basis to solve the two dimensional pseudo time dependent Euler or compressible Navier Strokes equations. Research into solution algorithms for that upwind method yielded a more robust diagonally dominant (DDADI) approximate factorization that subsequently led to a family of rapidly convergent and data storage and management efficient relaxation schemes. Those effectively explicit and unconditionally stable upwind algorithms have led to a simple robust boundary procedure based on interpolation of conservative variable data from other patches overlying interior patch boundaries where coordinates are discontinuous. Results of preliminary tests with model problems show the desired accuracy and great potential

AD-A174 958

AD-A174 958 CONTINUED

for enhancing engineering productivity. Keywords: Euler equations; Flow fields; Algebraic grid generation; Upwind method; Relaxation; and Approximate factorization.

DESCRIPTORS: (U) *AERODYNAMIC CONFIGURATIONS, *GAS DYNAMICS, RELAXATION, ACCURACY, AERODYNAMICS, ALGEBRA, ALGORITHMS, BOUNDARIES, COMPRESSIBLE FLOW, COMPUTATIONS, CONTROL, CONVERGENCE, COORDINATES, DATA STORAGE SYSTEMS, DIFFERENTIAL EQUATIONS, DISTRIBUTION, ENGINEERING, FLOW, FLOW FIELDS, GEOMETRY, GRIDS, HIGH RESOLUTION, INTERPOLATION, MESH, MODELS, NAVIER STOKES EQUATIONS, PRODUCTIVITY, SIMULATION, SOLUTIONS(GENERAL), TWO DIMENSIONAL, VARIABLES

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3

AD-A174 958

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 957 .12 2/0.20 6/0

VERAC INC SAN DIEGO CA

(U) OCCAM First Quarterly Research and Development Status Report: June-August 1986,

SEP 86 32P

PERSONAL AUTHORS: Kosko,Bart ;Guest,Clark ;

CONTRACT NO. F49620-86-C-0070, ARPA Order-5794

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-86-2129

UNCLASSIFIED REPORT

ABSTRACT: (U) The first quarter of the OCCAM contract effort was especially fruitful. Several pure results were obtained in optical conceptual computing and associative memories. These results include the formal definitions of and theorems on bidirectional associative memories and fuzzy associative memories, the first-principles proof that differential Hebbian learning subsumes standard Hebbian learning, the construction of a new optically computable fuzzy integral, a quantitative theory of fuzzy cognitive map combination and inferencing, the design and preliminary simulation of a novel all-optical dynamical associative memory, the first optical design for implementing the fundamental fuzzy set/logic operations of pairwise minimum and maximum, the design and preliminary simulation of a translation, rotation, and scale invariant optical preprocessor suitable for pattern recognition by associative memory, and the design and construction of an associative memory demonstration computer board. Several of these results are currently in preparation as technical papers. Some have been presented at professional speaking engagements.

DESCRIPTORS: (U) *ASSOCIATIVE PROCESSING, *LOGIC, *OPTICAL PROCESSING, *COMPUTATIONS, *LEARNING, OPERATION, INVARIANCE, PREPROCESSING, SCALE, THEORY, SIMULATION

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1

AD-A174 957

AD-A174 955 .12 5/0.12 6/0.20 6/0

HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER

(U) Optical Symbolic Processor for Expert System Execution.

DESCRIPTIVE NOTE: Quarterly technical rept. 1 Jun-31 Aug 86,

NOV 86 18P

PERSONAL AUTHORS: Derstine,Matthew ;Guha,Aloke ; Ramnarayan,Raja ;

CONTRACT NO. F49620-86-C-0082, ARPA Order-5794

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-86-2213

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the Optical Symbolic Processor for Expert System Execution program is to develop concepts for optical computers which can perform real-time symbolic processing. The program is divided into two sections, architecture development and development of a device for reconfigurable interconnects. In the first quarter of the program, only architecture development work was performed. The approach for this phase of the program has been to examine computational models of computer languages and determine the primitive operations required. Possible optical implementations of these primitives were then examined and evaluated. In general, a top down approach was taken with the goal of a direct optical implementation of the desired primitive operations. It was found that the computational requirements of logic languages and functional languages are primitive operations which involve manipulation of complex data structures such as graphs and trees, and that the execution of the languages can be described as manipulations of those data structures. The representation of the complex data structures imply that the representations must be exact (digital) and that some means to denote connections between data items, such as pointers, is required. Since the representation between data items is more important than the actual items stored,

AD-A174 955

AD-A174 955 CONTINUED

the most important functions involve the manipulation of the data structures. Examination of the optical architectures available to represent and implement the functions identified showed some way to perform location addressable memory was needed.

DESCRIPTORS: (U) *MEMORY DEVICES, *ARCHITECTURE, *COMPUTERS, *PROGRAMMING LANGUAGES, *GRAPHS, *OPTICAL PROCESSING, *SYMBOLS, *TREES, PROCESSING, REAL TIME, ADDRESSING, DATA BASES, COMPUTATIONS, REQUIREMENTS, OPTICAL EQUIPMENT, MATHEMATICAL MODELS, SYMBOLS

IDENTIFIERS: (U) PE61102F, WUAFOSR230681

AD-A174 954 .1 3/0.20 11/0

WISCONSIN UNIV-MADISON DEPT OF MATHEMATICS

(U) Optimal and Insensitive Control of Hyperbolic Distributed Parameter Systems with Applications to Wing Flutter Problems.

DESCRIPTIVE NOTE: Final rept. Feb 84-Jan 86,

JAN 86 72P

PERSONAL AUTHORS: Russell,David L. ;

CONTRACT NO. AFOSR-84-0088

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2187

UNCLASSIFIED REPORT

ABSTRACT: (U) The titles include: On the Dirichlet Neumann Boundary Control Problem Associated with Maxwell's Equations in a Cylindrical Region, A Floquet decomposition for Volterra Equations with Periodic Kernel and a transform Approach to Linear Recursion Equations, and Mathematical Models for the Elastic Beam and their Control Theoretic Implications, and Mathematical Models for the Elastic Beam with Frequency Proportional Damping.

DESCRIPTORS: (U) *FLUTTER, *VIBRATION, *DAMPING, DECOMPOSITION, FREQUENCY, MATHEMATICAL MODELS, CONTROL, OPTIMIZATION, SENSITIVITY, WINGS, ELASTIC PROPERTIES, DISTRIBUTION, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, MAXWELLS EQUATIONS, VOLTERRA EQUATIONS, RECURSIVE FUNCTIONS, BEAMS(STRUCTURAL)

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 953 .13 8/0

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

(U) Reliability of Complex Devices in Random Environments.

DESCRIPTIVE NOTE: Interim rept.,

JUL 86 38P

PERSONAL AUTHORS: Cinlar,E. ;Ozekici,S. ;

REPORT NO. EES-86-14

CONTRACT NO. AFOSR-82-0189

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2138

UNCLASSIFIED REPORT

ABSTRACT: (U) The lifetimes of the components of a device depend on each other because of their joint dependence on the environmental conditions. The authors introduce intrinsic age processes, one for each component, to handle such dependence. The data required can be obtained by experiments under controlled laboratory conditions. The computations needed for randomly varying conditions are recursive and can be used for making decisions regarding maintenance and replacement. Keywords: multi-component devices; semimarkov processes.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *PARTS, *RELIABILITY, COMPUTATIONS, CONTROL, ENVIRONMENTS, SEMIMARKOV PROCESSES, LABORATORY TESTS, DECISION MAKING, MAINTENANCE, REPLACEMENT, DISTRIBUTION FUNCTIONS, EXPERIMENTAL DATA

IDENTIFIERS: (U) NUAFOSR2304A5, PE61102F

AD-A174 953

AD-A174 952 .20 4/0

TORONTO UNIV DOWNSVIEW (ONTARIO) INST FOR AEROSPACE STUDIES

(U) Finite-Difference Solutions for Compressible Laminar Boundary-Layer Flows of a Dusty Gas over a Semi-Infinite Flat Plate.

DESCRIPTIVE NOTE: Interim rept.,

AUG 86 127P

PERSONAL AUTHORS: Wang,B. Y. ;Glass,I. I. ;

REPORT NO. UTIAS-311

CONTRACT NO. AFOSR-82-0096

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2151

UNCLASSIFIED REPORT

ABSTRACT: (U) A finite difference method is used to investigate compressible, laminar boundary layer flows of a dilute dusty gas over a semi-infinite flat plate. Details are given of the implicit finite difference schemes as well as the boundary conditions, initial conditions and compatibility conditions for solving the gas particle boundary layer equations. The flow profiles for both the gas and particle phases were obtained numerically along the whole length of the plate from the leading edge to far downstream of it. The finite difference solutions in the large slip region and the small slip region are compared with the asymptotic solutions and good agreement is achieved. The boundary layer characteristics of interest, including the wall shear stress, the wall heat transfer rate and the displacement thickness, are calculated. The alteration of the flow properties owing to the presence of particles is discussed in detail. It was found that the boundary layer flow of a dusty gas can be divided into three distinct flow regimes which are characterized by quasi-frozen, nonequilibrium and quasi-equilibrium flows and that at a critical distance from the loading edge the particle

AD-A174 952

AD-A174 952 CONTINUED

velocity at the wall decelerates to zero and near equilibrium is achieved between the gas and particle flows. For the laminar boundary layer of a dusty gas, the shear stress and the heat transfer at the wall are increased and the displacement thickness is decreased compared with the pure gas case alone. (Canada).

DESCRIPTORS: (U) *NONEQUILIBRIUM FLOW, *TWO PHASE FLOW, *DUST, *COMPRESSIBLE FLOW, *LAMINAR BOUNDARY LAYER, *FINITE DIFFERENCE THEORY, *FLAT PLATE MODELS, ASYMPTOTIC SERIES, BOUNDARY LAYER, CANADA, DILUTION, GASES, BOUNDARIES, COMPATIBILITY, RANGE(DISTANCE), DISPLACEMENT, THICKNESS, DOWNSTREAM FLOW, SOLUTIONS(GENERAL), EDGES, PARTICLES, VELOCITY, PURITY, SHEAR STRESSES, WALLS, FLOW, LEADING EDGES, RATES

IDENTIFIERS: (U) WUAFOSR2307A1, PE61102F

AD-A174 952

AD-A174 951 .20 5/0.21 1/0.21 2/0

GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER

(U) Carbon Monoxide and Turbulence-Chemistry Interactions Measurements and Modeling of Turbulent Jet Diffusion Flames.

DESCRIPTIVE NOTE: Annual rept. 1 May 85-1 Jun 86,

JUN 86 47P

PERSONAL AUTHORS: Correa,S. M. ;

CONTRACT NO. F49620-85-C-0035

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-2121

UNCLASSIFIED REPORT

ABSTRACT: (U) Development of a fundamental understanding of turbulence-chemistry interactions remains one of the most important and challenging problems in turbulent reacting flows. This program couples laser based measurements and computer modeling of well-characterized laboratory-scale jet diffusion flames to study the effects of finite-rate chemistry and localized extinction in turbulent combustion. The long-range goal is to use this fundamental understanding for control of lean and high-altitude blow out in gas-turbine engines. The results of the first year of this program include: 1) improving the data base for CO/H2/N2 turbulent jet diffusion flames by analyzing direct measurements of CO2 concentrations from Strokes vibrational Raman intensities and by comparing two independent methods of determining temperatures from the Raman data; 2) testing of the stretched laminar flamelet concept in turbulent diffusion flames by comparison of instantaneous and conditionally averaged Raman measurements in turbulent H2 and CO/H2/N2 jet diffusion flame calculations and measurements; and 3) testing of a diffusion flame pilot for stabilization of turbulent jet flames at high Reynolds number.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *COMBUSTION,

AD-A174 951

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 951 CONTINUED

*TURBULENCE, *JET FLAMES, EXTINCTION, BLOWOFF, LASER APPLICATIONS, DIAGNOSTIC EQUIPMENT, EQUILIBRIUM(GENERAL), REACTION KINETICS, RAMAN SPECTROSCOPY, FUELS, HYDROGEN, NITROGEN, CARBON MONOXIDE, DIFFUSION, FLAMES, PILOTS, ENGINES, GAS TURBINES, RAMAN SPECTRA, DATA BASES, MEASUREMENT, HIGH RATE, REYNOLDS NUMBER, JET FLAMES

IDENTIFIERS: (U) MUAFOSR2308A2, PE61102F

AD-A174 949 .20 4/0.21 1/0

CALIFORNIA INST OF TECH PASADENA

(U) Chemical Reactions in Turbulent Mixing Flows.

DESCRIPTIVE NOTE: Annual rept. for period ending 15 Apr 86.

APR 86 43P

PERSONAL AUTHORS: Liepmann,H. W. ;Broadwell,J. E. ; Dimotakis,P. E. ;

CONTRACT NO. AFOSR-83-0213

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-2122

UNCLASSIFIED REPORT

ABSTRACT: (U) Work is continuing in both gas phase and liquid phase turbulent mixing and chemical reactions. In the gas phase shear layer work, our investigations are concentrating on shear layer free stream density ratio effects, finite kinetic rate (Damkohler number) effects, and heat release effects the latter up to a temperature rise in the combustion zone of the order of 1,000K. In jet flows, the development of laser Rayleigh scattering techniques is progressing towards conserved scalar measurements down to diffusion space and time scales. In the liquid phase work, laser induced fluorescence measurements in both shear layer and jet flows have yielded considerable new information on the mixing process and statistics, permitting direct estimates as the probability density function in both cases. Theoretical work in progress is addressing the finite chemical rate problem as well as the diffusion limited shear layer mixing problem. Keywords: Turbulence; Flame; Damkohler number; Shear Layer; Jet Combustion.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *TURBULENT FLOW, COMBUSTION, ESTIMATES, GASES, HEAT, JET FLOW, LASER INDUCED FLUORESCENCE, LASERS, LAYERS, LIGHT SCATTERING, LIQUID PHASES, MEASUREMENT, MIXING, PROBABILITY DENSITY FUNCTIONS, RAYLEIGH SCATTERING, RELEASE, SCALAR FUNCTIONS,

AD-A174 949

AD-A174 951

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 949 CONTINUED

SCALE, SHEAR PROPERTIES, TIME, TURBULENCE,

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F

AD-A174 946 .20 5/0

SRI INTERNATIONAL MENLO PARK CA

(U) Two-Photon Detection Techniques for Atomic Fluorine.

DESCRIPTIVE NOTE: Annual rept. 1 Jan 85-1 Jan 86,

APR 86 11P

PERSONAL AUTHORS: Bischel,William K. ;

REPORT NO. SRI-MP-86-090

CONTRACT NO. F49620-85-K-0005

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-86-2124

UNCLASSIFIED REPORT

ABSTRACT: (U) During the first year of the project, the multiphoton spectroscopy of atomic fluorine was investigated to determine if three photon excitation could be used for remote detection applications. The first observation of resonantly enhanced multiphoton ionization (REMP I) of atomic fluorine is reported. Four excited states are observed for dye laser wavelengths in the range of 286 nm corresponding to a three photon resonant transition in a 3+2 photon ionization process. REMP I spectra of molecular fluorine in a 3+1 photon process are also observed. The resonant excited states in the spectra have been identified using absorption spectra published in the literature. In the present experiment, it is estimated that 0.03 millitorr of fluorine atoms can be detected with a signal to noise ratio of two. An apparatus is under development to test the techniques of two photon excited fluorescence and coherent anti Stokes Raman spectroscopy for detection of atomic fluorine.

DESCRIPTORS: (U) *EMISSION SPECTRA, *REMOTE DETECTORS, *EMISSION SPECTROSCOPY, *FLUORINE, OPTICAL PUMPING, RAMAN SPECTROSCOPY, IONIZATION, PHOTONS, REMOTE DETECTORS, EXCITATION, ATOMS, SIGNAL TO NOISE RATIO, RESONANCE, TRANSITIONS, DETECTION

AD-A174 949

AD-A174 946

AD-A174 946 CONTINUED

IDENTIFIERS: (U) CARS(Coherent Antistokes Raman Spectroscopy), REMPI(Resonantly Enhanced Multiphoton Ionization), *Three photon absorption, *Multiphoton spectroscopy, WUAFOSR2308A3, PE61102F

AD-A174 945 .12 3/0

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) Recent Discoveries on A-Optimal Designs for Comparing Test Treatments with Controls.

DESCRIPTIVE NOTE: Interim rept.,

JUN 86 23P

PERSONAL AUTHORS: Hedayat,A. S. ;Majumdar,Dibyen ;

REPORT NO. TR-86-04

CONTRACT NO. AFOSR-85-0320

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2119

UNCLASSIFIED REPORT

ABSTRACT: (U) This document to introduce the problem with an example. How should we design an experiment to compare 4 test treatments with a control, using 18 experimental units? As a statistical question we will not be able to answer it unless it is asked in a more precise manner. To begin with we need to postulate a model for the response observed upon application of a treatment or control, to an experimental unit. This paper considers three possible models: 1) 0-way elimination of heterogeneity model in which all experimental units are homogeneous before application of treatments, 2) 1-way elimination of heterogeneity model in which the experimental units can be divided into several homogeneous blocks, and 3) 2-way elimination of heterogeneity model in which the experimental units can be conceptually arranged according to rows and columns.

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, HETEROGENEITY, STATISTICAL TESTS, MATHEMATICAL MODELS, OPTIMIZATION

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 944 .4 1/0

TEL-AVIV UNIV (ISRAEL) DEPT OF GEOPHYSICS AND PLANETARY SCIENCES

(U) The Morphology of Broken Cloud Fields over Ocean Surfaces Using LANDSAT.

DESCRIPTIVE NOTE: Final rept. 15 Sep 84-14 Sep 85,

MAY 86 141P

PERSONAL AUTHORS: Joseph,Joachim H. ;

CONTRACT NO. AFOSR-84-0357

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-86-2126

UNCLASSIFIED REPORT

ABSTRACT: (U) The aims of our study as outlined in our original proposal were the following: (1) Carry out an initial study of suitably chosen LANDSAT data over both land and sea; (2) Develop the first step in the evolution of semi-automatic computer algorithms to obtain cloud morphology data on a global and long-term basis; (3) Provide a basis for future coordinated satellite, air and ground-based experiments on cloud field properties. (4) Test and improve the modelling of cloud field optical properties for various purpose; (5) Use the data for testing models of atmospheric dynamics on various scales and to develop methods for using cloud morphology data as diagnostics for large scale atmospheric characteristics. These aims have been carried out for the most part.

DESCRIPTORS: (U) *ATMOSPHERIC PHYSICS, *ATMOSPHERICS, MODELS, *CLOUD PHYSICS, ALGORITHMS, CLOUDS, COMPUTERS, GLOBAL, LONG RANGE(TIME), MORPHOLOGY, OPTICAL PROPERTIES, SEMIAUTOMATIC, MARINE METEOROLOGY, METEOROLOGICAL DATA, SCALING FACTORS, OCEAN SURFACE, SCIENTIFIC SATELLITES, ISRAEL

IDENTIFIERS: (U) LANDSAT satellites, Broken could fields, WUAFOSR2310A1, PE61102F

AD-A174 944

AD-A174 942 .9 3/0

ECODYNAMICS RESEARCH ASSOCIATES INC ALBUQUERQUE NM

(U) Adaptive Grid Generation.

DESCRIPTIVE NOTE: Final rept. 15 May 82-30 Jan 84,

MAY 86 8P

PERSONAL AUTHORS: Roache,Patrick J. ;

REPORT NO. ERA-5-86

CONTRACT NO. F49620-82-C-0064

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-86-2185

UNCLASSIFIED REPORT

ABSTRACT: (U) Algorithms were developed for the generation of grids in 2D and 3D. The 3D code development involved extensive use of computer Symbolic Manipulation. A rigorous code validation procedure was developed. A controversy on the effect of strong coordinate stretching was resolved, with proof that the order of accuracy is not reduced. The contention that a well known method always produces a nonfolded grid was disproven. A family of adaptive algorithms was developed, involving both interior adaption and especially boundary adaption. Initial work was begun on an extension of the variational approach to grid generation. The grid generation algorithms have been applied in the 2D and 3D ELF codes (Electric Field) used in the design of laser electrodes and switches. Applications are in the Pulsed Power area, including SDI research and development. Keywords: adaptive grid generation; elliptic grid generation; symbolic manipulation; code verification; variational formulation; lasers; electrode design.

DESCRIPTORS: (U) *LASER COMPONENTS, *TUBE GRIDS, FABRICATION, EXPERIMENTAL DESIGN, TWO DIMENSIONAL, THREE DIMENSIONAL, LASER MATERIALS, COMPUTER PROGRAMMING, ADAPTIVE SYSTEMS, GRIDS, CODING, ELECTRODES, LASERS, ACCURACY, ELECTRIC FIELDS, ELLIPSES, POWER, APPROACH,

AD-A174 942

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 942 CONTINUED

VARIATIONAL PRINCIPLES

IDENTIFIERS: (U) Strategic defense initiative, WUAFOSR2304A3, PE61102F

AD-A174 941 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) The Effects of Variance Function Estimation on Prediction and Calibration: An Example.

DESCRIPTIVE NOTE: Technical rept. Aug 85-Aug 86,

AUG 86 15P

PERSONAL AUTHORS: Carroll,Raymond J. ;

REPORT NO. MIMEO-SER-1703

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-2139

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers fitting a straight line to data when the variances are not constant. In most fields, it is fairly common folklore thats how one estimates the variances does not matter too much when estimating the regression function. While this may be true, most problems do not stop with estimating the slope and intercept. Indeed, the ultimate goal of a study may be a prediction or a calibration. It is shown by an example that how one handles the variance function can have large effects. The point is almost trivial, but so often ignored that it is worth documenting. Additionally, this points out that one ought to spend time trying to understand the structure of the variability, a theoretical field that is not particularly well developed. Keywords: weighted least squares; heteroscedasticity.

DESCRIPTORS: (U) *ANALYSIS OF VARIANCE, *ESTIMATES, CALIBRATION, VARIATIONS, LEAST SQUARES METHOD, WEIGHTING FUNCTIONS, FUNCTIONS, REGRESSION ANALYSIS, MATHEMATICAL PREDICTION

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A174 942

AD-A174 941

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 940 .23 3/0

SRI INTERNATIONAL MENLO PARK CA

(U) Research on Problem-Solving Systems.

DESCRIPTIVE NOTE: Annual rept. (Final), 1 Oct 85-30 Sep 86,

OCT 86 19P

PERSONAL AUTHORS: Wilkins,David E. ;

CONTRACT NO. F49620-85-K-0001

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-86-2190

UNCLASSIFIED REPORT

ABSTRACT: (U) The main task of this program is to develop powerful methods of representing, generating, and executing hierarchical plans that contain parallel actions. Execution involves monitoring the state of the world and, possibly, replanning if things do not proceed as expected. Over the last few years, we have designed and implemented a system called SIPE (System for Interactive Planning and Execution Monitoring), the purpose of which is to demonstrate the heuristic adequacy of our approach to this problem. Our basic in procedural networks. Our research this year concentrated on improving SIPE to provide a high-level reasoning capability for a mobile robot. Topics include: Sonar interfaces; Low-level sonar preception; Improving the replanning algorithm; Matching variables with PRED constraints; Efficiency considerations. Keywords: Control systems; Artificial intelligence.

DESCRIPTORS: (U) *SYSTEMS APPROACH, *PROBLEM SOLVING, ALGORITHMS, ARTIFICIAL INTELLIGENCE, CONTROL SYSTEMS, GLOBAL, HIERARCHIES, INTERACTIONS, INTERFACES, LOW LEVEL, MATCHING, MOBILE, PLANNING, ROBOTS, SONAR, VARIABLES

IDENTIFIERS: (U) SIPE(System for Interactive Planning and Execution monitoring)

AD-A174 940

AD-A174 938 .12 3/0.25 3/0

CONNECTICUT UNIV STORRS

(U) Summary of Accomplished Work under the Air Force Grant AFOSR-83-0229.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 83-31 Jul 85,

MAY 86 5P

PERSONAL AUTHORS: Papantoni-Kazakos,P. ;

CONTRACT NO. AFOSR-83-0229

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2149

UNCLASSIFIED REPORT

ABSTRACT: (U) A theory for robust filtering and smoothing is formulated that combines the qualitative robustness theory with the theory of saddle point games. This theory finds robust filters for certain contaminated classes of stochastic processes. Robust predictors, interpolators, and filters are designed for various classes of vector stationary processes with contaminated spectra. Measures of breakdown points and curves, efficiency, and performance variation within the classes are produced. A variety of multiple access transmission protocols are designed for various levels of available feedback and feedback sensing. The studies include asymptotically many user models. Limited sensing algorithms are devised with the with the highest existing throughput, to this point in time, and with robust characteristics in the presence of feedback errors. A unified methodology for the delay analysis of a big variety of random access algorithms is devised.

DESCRIPTORS: (U) *ALGORITHMS, *PREDICTIONS, *STOCHASTIC PROCESSES, STATISTICAL PROCESSES, *INTERPOLATION, *MULTIPLE ACCESS, LIMITATIONS, MODELS, RANDOM ACCESS COMPUTER STORAGE, SPECTRA, TRANSMITTANCE, USER NEEDS, VECTOR ANALYSIS, CONTAMINATION, DETECTION, ERRORS, FEEDBACK

AD-A174 938

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 938 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 938 .12 2/0

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

(U) Numerical Analysis.

DESCRIPTIVE NOTE: Final rept. 15 Jun 82-14 Jun 86,

JUN 86 10P

PERSONAL AUTHORS: Parter,Seymour V. ;

CONTRACT NO. AFOSR-82-0275

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-86-2080

UNCLASSIFIED REPORT

ABSTRACT: (U) New development in computer architecture (parallel computers and multi-processors) and a renewed interest in 3-dimensional problems and higher-order problems have revived interest in iterative methods for elliptic and parabolic finite-difference/finite-element equations. This document considers the linear system Ax = y which arises from the discretization of an elliptic boundary-value problem. A direct (linear stationary) iterative method arises from the splitting A = M - N and takes the form Mx to the k + 1 power = Nx to the k power + y.

DESCRIPTORS: (U) *NUMERICAL ANALYSIS, *ITERATIONS, BOUNDARY VALUE PROBLEMS, COMPUTER ARCHITECTURE, DIFFERENCE EQUATIONS, ELLIPSES, FINITE DIFFERENCE THEORY, FINITE ELEMENT ANALYSIS, LINEAR SYSTEMS, PARABOLAS, PARALLEL PROCESSORS, MULTIPROCESSORS, THREE DIMENSIONAL

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 930 .12 1/0.12 9/0

MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

(U) On Frequency Detection by Zero-Crossings.

86 5P

PERSONAL AUTHORS: Kedem,Benjamin ;

CONTRACT NO. AFOSR-82-0187

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-2081

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Signal Processing, v10 p303-306 1986.

ABSTRACT: (U) It is possible to solve explicitly for the frequency of a sinusoid in the presence of noise in terms of expected zero-crossings counts. This may, however, lead to highly variable estimates. A more robust method is to combine linear filtering with zero-crossing counts in the detection of very weak signals buried in noise.

DESCRIPTORS: (U) *DETECTION, *ESTIMATES, *LINEAR FILTERING, *SIGNALS, LOW STRENGTH, VARIABLES

IDENTIFIERS: (U) PE61102F, WUAFSOSR2304A5

AD-A174 930

AD-A174 928 .6 1/0.6 11/0

ROCHESTER UNIV NY

(U) The Cytoskeleton: A Target for Toxic Agents. *Proceedings of the Rochester International Conference on Environmental Toxicity (16th) Held in Rochester, New York on 4-6 June 1984.*

DESCRIPTIVE NOTE: Final rept. 1 Jun 84-31 May 85,

86 277P

PERSONAL AUTHORS: Clarkson,Thomas W. ;

CONTRACT NO. AFOSR-84-0098

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-88-2041

UNCLASSIFIED REPORT

Availability: Plenum Press, 233 Spring St., New York, NY *10013 PC $42.50 (No copies furnished by DTIC/NTIS).*

ABSTRACT: (U) An in-depth discussion of the effects and mechanisms of action of some toxic agents on the cytoskeleton is provided. Mammalian and other eukaryotic cells contain protein networks within the cytoplasm comprised of microfilaments, intermediate filaments, and microtubules. These components of the cytoskeleton play a key role in cell shape, motility, intracellular organization and transport, and cell division. Because of the complex functional roles of the cytoskeleton which vary with cell type, degree of differentiation, and cell cycle, its disruption may result in a variety of cellular changes. This expanding field in cell biology has already attracted the interest of toxicologists and environmental health scientists as a potentially fruitful area of research. There is mounting evidence that certain toxic and chemotherapeutic compounds, as well as physical agents such as radiation and hydrostatic pressure, disrupt the normal structure and function of the cytoskeleton.

DESCRIPTORS: (U) *TOXICOLOGY, *FIBERS, *PROTEINS,

AD-A174 928

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 928 CONTINUED

*CYTOPLASM, CELLS(BIOLOGY), CELL DIVISION, CELL STRUCTURE, CYCLES, SHAPE, FIBERS, TOXICITY, TOXIC AGENTS, TUBES, HYDROSTATIC PRESSURE, FILAMENTS, MICROSTRUCTURE, NETWORKS

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F

AD-A174 928

AD-A174 921 .12 9/0.20 12/0

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Study of Infrared Nonlinear Processes in Semiconductors.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 85-30 Sep 86,

SEP 86 8P

PERSONAL AUTHORS: Wolff,P. A. ;Yuen,S. Y. ;

CONTRACT NO. AFOSR-85-0269

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-86-2211

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary aim of the program is to discover materials and/or structures with large, fast nonlinear optic susceptibilities. Such elements are required in optical signal processing systems, and for protection of imaging devices. The program is mainly experimental, with supporting theoretical work. Tests of nonlinear crystals also provide important information concerning carrier kinetics in semiconductors, through the difference frequency variation of X(3). In the past year, we have used this technique to determine carrier relaxation times, in the picosecond range, in n-Si :P and HgTe. Where appropriate, we investigate the device implications of optical-semiconductor interactions. Our studies of free carrier, spin-induced Faraday rotation, were motivated by the possibility of using this effect in tunable IR filters and CO2 laser isolators.

DESCRIPTORS: (U) *SIGNAL PROCESSING, *SEMICONDUCTORS, *NONLINEAR SYSTEMS, CRYSTALS, DIFFERENCE FREQUENCY, IMAGES, INFRARED RADIATION, KINETICS, OPTICAL EQUIPMENT, OPTICAL PROCESSING, PROTECTION, THEORY, VARIATIONS

IDENTIFIERS: (U) WUAFOSR2305B1, PE61102F

AD-A174 921

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 919 .12 3/0.12 9/0.25 3/0

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) The Study of Certain Aspects of Probability with Applications in Communication Theory.

DESCRIPTIVE NOTE: Final rept. 1 Oct 80-30 Sep 85,

JUN 86 22P

PERSONAL AUTHORS: Wise,Gary L. ;

CONTRACT NO. AFOSR-81-0047

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2212

UNCLASSIFIED REPORT

ABSTRACT: (U) Many aspects of signal processing and communication theory have proven to be limited by a lack of sufficient developments in the areas of probability theory and mathematical statistics. Our investigations attempted to overcome this deficiency by contributing both to the underlying theoretical basis of the area as well as to some applied aspects of the area, and we have obtained a large body of results. Some principal thrust areas of our research effort have been concerned with quantization theory, signal detection, and estimation theory. A brief topical overview of our research areas follows. Quantization - existence of optimal quantizers, convergence properties of sequences of quantizers, design of quantizers, Signal detection - effects of statistical dependence, relative efficiency between detectors, nonparametric detection, Estimation - effects of imperfect data, a general class of fidelity criteria leading to nonlinear estimators, convergence properties of sequences of estimators; and Additional areas - meadian filters; stability of differential equations with random coefficients; bandwidth properties of random processes; contention resolution in local area computer networks; image compression; counterexamples.

DESCRIPTORS: (U) *PROBABILITY, *INFORMATION THEORY,

AD-A174 919 CONTINUED

*DETECTORS, *ESTIMATES, *COMMUNICATIONS NETWORKS, *QUANTIZATION, *CONVERGENCE, *STATISTICAL ANALYSIS, *SIGNAL PROCESSING, THRUST, STABILITY, DETECTION, COMPUTERS, NETWORKS, ESTIMATES, NONLINEAR SYSTEMS, COMPRESSION, IMAGES, OPTIMIZATION, COEFFICIENTS, BANDWIDTH

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A174 919

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 917 .20 11/0

COMPUTATIONAL MECHANICS CO INC AUSTIN TX

(U) Models and Computational Methods for Dynamic Friction Phenomena. I. Physical Aspects of Dynamic Friction. II. Continuum Models and Variational Principles for Dynamic Friction. III. Finite Element Models and Numerical Analysis.

DESCRIPTIVE NOTE: Interim rept.,

OCT 84 214P

PERSONAL AUTHORS: Oden,J. T. ;Martins,J. A. ;

REPORT NO. TR-84-07

CONTRACT NO. F49620-84-C-0024

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-2206

UNCLASSIFIED REPORT

ABSTRACT: (U) This work addresses the general problems of formulating continuum models of a large class of dynamic frictional phenomena and of developing computation methods for analyzing these phenomena. Of particular interest are theories which can adequately predict stick slip motion, frictional damping in structural dynamics, and sliding resistance. This work id divided into three principal parts. In Part I, a large body of experimental and theoretical literature on friction is critically reviewed and interpreted as a basis for models of dynamic friction phenomena. In part II, continuum models of interfaces are developed which simulate key interface properties identified in Part I. Variational principles for a class of dynamic friction problems are also established. In Part III, finite element models and numerical algorithms for analyzing dynamic friction are presented. Also, a dynamic stability analysis is presented in which it is established that stick slip motion can be associated with dynamic instability of the governing nonlinear system for certain ranges of slip velocity and coefficient of friction.

AD-A174 917

AD-A174 917 CONTINUED

Numerical results suggest that the new models derived here can satisfactorily depict a large and important class of dynamic friction effects. Keywords: Friction damping; Sliding friction models; Finite element methods; and Structural dynamic.

DESCRIPTORS: (U) *FRICTION, *FINITE ELEMENT ANALYSIS, *SLIDING FRICTION, *VARIATIONAL PRINCIPLES, ALGORITHMS, COEFFICIENTS, CONTINUUM MECHANICS, DAMPING, DYNAMICS, INTERFACES, MATHEMATICAL MODELS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, RESISTANCE, SLIDING, STABILITY, STRUCTURAL PROPERTIES

IDENTIFIERS: (U) WUAFOSR2302B1, PE61102F

AD-A174 917

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 916 .10 2/0.20 5/0

OREGON GRADUATE CENTER BEAVERTON DEPT OF APPLIED PHYSICS AND ELECTRICAL ENGINEERING*

(U) Investigation of Surface Phenomena in Thermionic Energy Conversion.

DESCRIPTIVE NOTE: Final rept. 1 Mar 83-31 Jul 86,

OCT 86 62P

PERSONAL AUTHORS: Davis,P. R. ;

CONTRACT NO. AFOSR-83-0105

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-86-2100

UNCLASSIFIED REPORT

ABSTRACT: (U) The general goal of this project has been to enhance the understanding of surface phenomena related to thermionic energy conversion (TEC), in particular, surface properties of electrode materials which have the potential of enhancing significantly the performance of practical devices for advanced mode TEC. A variety of surface analysis techniques has been devoted to study of clean surface properties of Lanthanum Boride single crystals. Investigations of residual gas interactions with low work function emitter surfaces has been directed toward the study of 02 interactions with low work function single crystal faces of Lanthanum Boride. Measurements were made on both the clean and oxidized Lanthanum Boride surfaces using Auger electron spectroscopy (AES) and x-ray photoelectron spectroscopy (XPS) and quadrupole mass spectrometry (QMS) for analysis of the desorbing molecular species. The nature of the surface oxide species were correlated with thermal evaporation characteristics. The coadsorption of Zirconium and oxygen onto Tungsten causes a lowering of the work function of the (100) crystal plane from 4.7 to 2.6 eV. The resulting surface is remarkably stable and practical application as a cathode for fine-focussed beam applications.

AD-A174 916 CONTINUED

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *SURFACE CHEMISTRY, *ENERGY CONVERSION, *THERMIONIC CONVERTERS, AUGER ELECTRON SPECTROSCOPY, BORIDES, ELECTRODES, EVAPORATION, GASES, HEAT, INTERACTIONS, LANTHANUM COMPOUNDS, MASS SPECTROMETRY, MATERIALS, OXIDATION, OXIDES, OXYGEN, QUADRUPOLE MOMENT, RESIDUALS, SINGLE CRYSTALS, SURFACE ANALYSIS, SURFACE PROPERTIES, SURFACES, TUNGSTEN, WORK FUNCTIONS, X RAY PHOTOELECTRON SPECTROSCOPY

IDENTIFIERS: (U) Desorption, Adsorption, Zirconium, Crystal structure

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 915 .14 2/0.20 6/1

CALIFORNIA UNIV IRVINE DEPT OF ELECTRICAL ENGINEERING

(U) DoD-University Research Instrumentation Program.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Apr 86,

OCT 86 10P

PERSONAL AUTHORS: Tsai,Chen S. ;

CONTRACT NO. AFOSR-84-0270

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-86-2069

UNCLASSIFIED REPORT

ABSTRACT: (U) The capability of this facility was rather limited in terms of line resolution, contact uniformity, fabrication yield, and versatility. Although much encouraging results have been demonstrated with the preliminary devices, the lack of an ion-milling machine has kept on-going research projects from achieving much more results expeditiously. Similarly, the lack of the Ion Milling Machine has kept the group from fabricating micron-width grooves, slots, gratings, ridge waveguide, etc., on LiNbO3 and GaAs substrates for robust coupling between the optical fibers and the devices being explored, and thus realization of integrated optic device modules. An Ion-Milling Machine has been purchased. A special laboratory compartment together with necessary electrical and wet-lab utilities were constructed for installation of the complete ion milling machine facility. The facility will be in full operation in the near future.

DESCRIPTORS: (U) *MILLING MACHINES, LITHIUM NIOBATES, GRATINGS(SPECTRA), LABORATORY EQUIPMENT, OPTICAL WAVEGUIDES, FABRICATION, FIBER OPTICS, GALLIUM ARSENIDES, INSTRUMENTATION, ION BEAMS, OPERATION, RESOLUTION, RIDGES, SPECTRAL LINES, SUBSTRATES, WAVEGUIDES, YIELD

IDENTIFIERS: (U) WUAFOSR2917A3, PE61102F

AD-A174 915

AD-A174 914 .13 13/0.22 2/0

MCDONNELL DOUGLAS ASTRONAUTICS CO HUNTINGTON BEACH CA

(U) Passively Damped Joints for Advanced Space Structures.

DESCRIPTIVE NOTE: Final rept. 15 May 83-15 Jan 86,

MAR 86 190P

PERSONAL AUTHORS: Peebles,James H. ;Trudell,Richard W. ; Blevins,Creed E. ;Prucz,Jacky C. ;

REPORT NO. MDC-H2334

CONTRACT NO. F49620-83-C-0117

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-2075

UNCLASSIFIED REPORT

ABSTRACT: (U) This report includes: (1) the development of a viscoelastic materials selection guide for this research activity; (2) the development of an analytic statics model of the joint specimens; (3) the designs, fabrication and testing of 21 viscoelastic joint specimens, including the development of a new material; (4) the procurement, fabrication and assembly of test equipment for the test program at the Georgia Institute of Technology as well as the development of data reduction computer programs; (5) the development and successful demonstration of transient pulse and simplified steady state methods for evaluating energy losses in joints; and (6) the performance of outgassing tests on several viscoelastic materials.

DESCRIPTORS: (U) *DAMPING, *JOINTS, *SPACE SYSTEMS, *STRUCTURES, STATICS, COMPUTER PROGRAMS, PASSIVE SYSTEMS, ASSEMBLY, DATA REDUCTION, DEMONSTRATIONS, ENERGY, LOSSES, MATERIALS, MATHEMATICAL MODELS, OUTGASSING, PERFORMANCE TESTS, PULSES, STATICS, TEST EQUIPMENT, TEST METHODS, TRANSIENTS, VISCOELASTICITY

IDENTIFIERS: (U) WUAFOSR2302B1, PE61102F

AD-A174 914

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 912 .12 1/0.14 2/0

MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

(U) A Stochastic Characterization of the Sine Function,

JUL 86 13P

PERSONAL AUTHORS: Kedem,Benjamin ;

CONTRACT NO. AFOSR-82-0187

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2078

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in American Mathematical Monthly, v93 n6 p430-440 Jun-Jul 86.

ABSTRACT: (U) It is shown that conditions based on level crossings and related quantities can ensure that a random sequency contains sinusoidal components. The results are first motivated by considerations of data-reduction in signal analysis, and then formulated precisely for stationary Gaussian sequences. An analogy is drawn with a characterization of the sine function in the nonrandom case. The problem dealt with in this paper derives from an important problem of modern technology: the signature problem. To understand the problem, consider the real life example of an operating automobile engine monitored by an electronic device which records the engine's vibration as an oscillating signal.This oscillating signal, regarded as a function of time characterizing the engine's operating condition, is called the engine's signature. The signature problem is generally to use the signature to tell whether the engine is functioning properly or malfunctioning, and to detect abnormalities such as cracks in the engine block and parts. Signature analysis is regularly performed on various sensitive parts of aircraft which may develop cracks or fractures as a result of metal fatigue.

DESCRIPTORS: (U) *ABNORMALITIES, *VIBRATION, *CROSSINGS, *SIGNALS, *SIGNATURES, *SINE WAVES, AIRCRAFT, AUTOMOTIVE VEHICLES, CRACKS, ELECTRONIC EQUIPMENT, ENGINES,

AD-A174 912

AD-A174 912 CONTINUED

FUNCTIONS, PARTS, SENSITIVITY, TIME DEPENDENCE

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 910 .14 2/0.20 12/0

WISCONSIN UNIV-MILWAUKEE DEPT OF PHYSICS

(U) System for Investigating Superconducting Films with Surface Acoustic Waves Down to 4.5 Millikelvin and Up to 4 GHz.

DESCRIPTIVE NOTE: Final scientific rept. 15 Jul 84-14 Jul 85.

JUL 85 5P

PERSONAL AUTHORS: Levy,Moises ;

CONTRACT NO. AFOSR-84-0221

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-86-2091

UNCLASSIFIED REPORT

ABSTRACT: (U) A system for investigating superconducting films with surface acoustic waves down to 4.3 millikelvin up to frequencies of 4 GHz and up to magnetic fields of 95 K Gauss has been ordered, received and assembled. A dilution refrigerator has been installed in a new laboratory. It has been tested in place down to 4.3 millikelvin. The refrigerator has a top loading probe with four interchangeable slugs which can be used for different millikelvin temperature experiments. Each slug has 13 electrical leads which can be connected at millikelvin temperatures. A superconducting magnet has been obtained which has been tested up to 95 K Gauss in conjunction with a helium lambda tip. All the parts for an automatic ultrasonic attenuation and velocity system in the frequency range of 10 MHz have been ordered and assembled. Parts for the submicron photolithography subsystem required to reproduce masks with linewidths of 0.3 u which will be used for making interdigital electrodes which will act as transducers to launch surface acoustic waves in the GHz range have been received and assembled.

DESCRIPTORS: (U) *SURFACE ACOUSTIC WAVES, *SUPERCONDUCTORS, EXPERIMENTAL DESIGN, ACOUSTIC

AD-A174 910 CONTINUED

ATTENUATION, LABORATORY TESTS, LABORATORY EQUIPMENT, ATTENUATION, ELECTRODES, PROBES, FILMS, REFRIGERATION SYSTEMS, SURFACE ACOUSTIC WAVES, MAGNETIC FIELDS, TRANSDUCERS

IDENTIFIERS: (U) *Superconducting films, Dilution refrigerators, PE61102F, WUAFOSR2917A3

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 908 .5 2/0.12 5/0

IOWA UNIV IOWA CITY OPTIMAL DESIGN LAB

(U) A Database Management System for Engineering Applications.

DESCRIPTIVE NOTE: Interim rept. Jul 84-Jun 85,

JUN 85 163P

PERSONAL AUTHORS: Shyy,Y-K. ;Mukhopadhyay,Santanu ;Arora, Jasbir S. ;

REPORT NO. ODL-85.23

CONTRACT NO. AFOSR-82-0322

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR TR-86-2205

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Master's thesis.

ABSTRACT: (U) This report describes design of a database management system called MIDAS which stands for Management of Information for Design and Analysis of Systems. The system is designed to handle large matrix data of different types. A prototype system is first implemented. The system is re-designed to improve its efficiency. Capabilities of the system are described. It is evaluated in the engineering environment by solving systems of linear equations. The system is flexible; its buffer size, page size and number of pages can be changed. Variations of these parameters is studied and their effect on the system performance is evaluated. It is concluded that the application programs must be developed carefully to efficiently use a database management system. In addition, application programmer must be somewhat knowledgeable of the internal workings of the system.

DESCRIPTORS: (U) *DATA BASES, *SYSTEMS ENGINEERING, DATA MANAGEMENT, MATHEMATICAL MODELS, SUBROUTINES, LINEAR ALGEBRAIC EQUATIONS, INPUT OUTPUT PROCESSING, THESES

AD-A174 908 CONTINUED

IDENTIFIERS: (U) MIDAS(Management of Information for Design and Analysis of Systems), Data Base Management Systems, APIPS(Application Program Interface Processing System), MMS(Memory Management System), PE61102F, WUAFOSR230781

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 904 .20 12/0

WISCONSIN UNIV-MILWAUKEE DEPT OF PHYSICS

(U) Thin Superconducting Film Characterization by Surface Acoustic Waves.

DESCRIPTIVE NOTE: Annual progress rept. 30 Sep 85-30 Sep 86.

NOV 86 14P

PERSONAL AUTHORS: Levy,Moises ;

CONTRACT NO. AFOSR-84-0350

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR TR-86-2090

UNCLASSIFIED REPORT

ABSTRACT: (U) Surface acoustic wave attenuation (SAW) and electrical resistivity on In/InO films has been measured. On one film it was found that both vortex antivortex dipoles associated with a Kosterlitz Thouless transition and excess local resistivity associated with granularity of the film contribute to the energy absorption in the film. On another film, with a high sheet resistivity, a peak in attenuation is observed which may be associated with a metal insulator transition at the local level. A technique for determining average grain size in a granular superconductor has been proposed. Proximity acoustoelectric coupling to a granular Al superconducting film has been demonstrated. This technique may be used to determine the separation between two surfaces that are less than 1000A apart. Measurement on the Er(1-x)Ho(x)Rh4B4 alloy system have been completed. A theoretical relaxation expression has been derived and is being used to analyze the maxima that have been observed in the attenuation curves. Preliminary measurements of both the attenuation and velocity of longitudinal waves in a single crystal of URu2Si2 have been performed.

DESCRIPTORS: (U) *SUPERCONDUCTORS, *SURFACE ACOUSTIC WAVES, *THIN FILMS, INDIUM, INDIUM COMPOUNDS, OXIDES,

AD-A174 904

AD-A174 904 CONTINUED

SPIN STATES, CRYSTAL STRUCTURE, ERBIUM COMPOUNDS, HOLMIUM COMPOUNDS, RHENIUM COMPOUNDS, BERYLLIUM COMPOUNDS, URANIUM COMPOUNDS, RUTHENIUM COMPOUNDS, SILICON COMPOUNDS, ENERGY ABSORBERS, ELECTRICAL RESISTANCE, SHEETS, ELECTRICAL CONDUCTIVITY, GRAIN SIZE, ACOUSTIC ATTENUATION, VELOCITY, WAVES

IDENTIFIERS: (U) Indium oxides, Spin photon interactions, *Superconducting films, PE61102F, WUAFOSR2306C1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 902 .8 10/0

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Motion and Stability of Saturated Soil Systems under Dynamic Loading.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 84-31 Jan 85,

APR 85 20P

PERSONAL AUTHORS: Sandhu,Ranbir S. ;

REPORT NO. OSURF-715927-85-5

CONTRACT NO. AFOSR-83-0055

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR TR-86-2094

UNCLASSIFIED REPORT

ABSTRACT: (U) In a review of the assumptions underlying various theories of interacting continua, an important finding was that the notion of the mixture as a continuum in motion is inadmissible except in the case of no relative motion between the constituents. Liquefaction of soil is primarily associated with relative motion of soil and water. Finite element implementation of Biot's theory was studied in respect to effectiveness of the popular time integration schemes as well as spatial discretization for one and two-dimensional wave propagation. Results showed that the conventional time-domain integration procedures which are quite effective for single material problems are not reliable for saturated soils. The numerical results were found to be quite sensitive to the choice of time-domain integration parameters. Variational formulations of Biot's theory were developed to construct a basis for alternative finite element approaches. For nonlinear problems, incremental equations were developed and variational formulation attempted allowing only material nonlinearity. In saturated soils subjected to dynamic loads, depending upon permeability and pore geometry, a part of the water would possible be trapped and move with the soil rather than relative to it. This mass coupling effect was

AD-A174 902

AD-A174 902 CONTINUED

examined parametrically. It was found that soil displacements are not sensitive to the degree of coupling, but the pattern of pore pressure in the ime domain could be affected significantly.

DESCRIPTORS: (U) *LIQUEFACTION, *SOIL MECHANICS, *DYNAMIC LOADS, INTEGRATION, TIME DOMAIN, NONLINEAR SYSTEMS, PERMEABILITY, FINITE ELEMENT ANALYSIS, COUPLING(INTERACTION), MASS, WAVE PROPAGATION, PATTERNS, PORE PRESSURE, GEOMETRY, POROSITY, SATURATION, SOILS, MATERIALS, TWO DIMENSIONAL, FORMULATIONS, DISPLACEMENT, SATURATION, VARIATIONAL PRINCIPLES

IDENTIFIERS: (U) Biot Theory, LPN-OSURF-763420/716894, PE61102F, WUAFOSR2307C1

AD-A174 902

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 900 .1 3/7.14 2/0

ARIZONA UNIV TUCSON ENGINEERING EXPERIMENT STATION

(U) Experiments in an Adaptable-Wall Wind Tunnel for V/STOL Testing.

DESCRIPTIVE NOTE: Final rept. 1 May 82-30 Sep 86,

SEP 86 184P

PERSONAL AUTHORS: Sears,W. R. ;Lee,D. C. ;

CONTRACT NO. AFOSR-82-0185

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2088

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments were carried out, over a period of two years, in an Adaptable-Wall wind tunnel configured for testing of airplane models at very large lift. The program was intended especially to demonstrate Proof of Concept for this type of wind tunnel, in which the simulated stream vector is inclined appreciably to the tunnel axis. The measured inner flow is matched to the computed, updated outer flow by an iterative process. Wall-adaptation controls in this tunnel are vaned panels in the floor and ceiling of the working section and a variable-angle inlet nozzle. Velocity components are measured by a Laser-Doppler system using a fixed laser and movable optical components. The test model used in these experiments was a high-wing V/STOL configuration having full-span wing flaps with lower-surface blowing of their inboard portions. In all of the experiments reported here, the combination of angle of attack, flap setting, and flap blowing was such as to produce large flow deflection and severe wall interference in a conventional tunnel. The model configuration was always laterally symmetrical, and most runs were made under the assumption of symmetrical flow. The iterative procedure, based on measured control matrices, typically led to minimum matching-discrepancies (root-mean-square values) of about three percent of stream speed after about six iterations. It is estimated that this reflects residual errors at the model of about one percent of stream speed. It is concluded that these results constitute successful Proof of Concept. Suggestions are made regarding the directions of further development of this type of wind tunnel. (Author)

AD-A174 900 CONTINUED

DESCRIPTORS: (U) *WIND TUNNELS, *SHORT TAKEOFF AIRCRAFT, *VERTICAL TAKEOFF AIRCRAFT, ADAPTATION, AIRCRAFT MODELS, AXES, CEILING, CONFIGURATIONS, DEFLECTION, DOPPLER SYSTEMS, ERRORS, EXTERNAL, FLAPS(CONTROL SURFACES), FLOW, HIGH RATE, INTENSITY, INTERFERENCE, ITERATIONS, LASERS, LIFT, MOBILE, MODEL TESTS, OPTICAL EQUIPMENT, RESIDUALS, SETTING(ADJUSTING), SIMULATION, STREAMS, SYMMETRY, TEST METHODS, VELOCITY, WALLS, WINGS, WIND TUNNEL MODELS, HIGH LIFT, WIND TUNNEL NOZZLES, WING BODY CONFIGURATIONS, ANGLE OF ATTACK, BLOWERS, CONTROL SYSTEMS, COMPUTER PROGRAMS, EXPERIMENTAL DESIGN

IDENTIFIERS: (U) Wind tunnel walls, Blowing flaps, *Adaptable wall wind tunnels, Computer program listings, BASIC programming language, PE61102F, WUAFOSR2307A1

AD-A174 900

AD-A174 900

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 898 .21 2/0.21 4/0

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MECHANICAL ENGINEERING

(U) Ignition of Fuel Sprays.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 83-30 Sep 85.

JUN 86 31P

PERSONAL AUTHORS: Sirignano,W. A. ;Sommer,H. T. ;Aggarwal, S. K. ;

CONTRACT NO. AFOSR-80-0203

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-2207

UNCLASSIFIED REPORT

ABSTRACT: (U) One-dimensional unsteady calculations to study the spray ignition process were performed first for a monodisperse fuel-air spray in front of a planar heated wall and later for polydisperse single-component fuel sprays. The effect of different droplet heating models was investigated and it is found that at certain equivalence ratios ignition delay time and energies can be smaller in the heterogeneous case than in the limiting gaseous premixed case. Because of the critical dependency of ignition upon the distance of the heat source to the nearest droplet, spray ignition criteria are not precisely defined by fuel type, droplet size distribution and equivalence ratio but a range of ignition delay times and ignition energies is found due to the probabilistic effect of droplet ignition. For polydisperse sprays it was found that ignition can be well correlated with an equivalent monodisperse spray by using a mean diameter based on the total surface area of the spray and not the Sauter-mean-diameter. the experimental part of the program was designed to verify the theoretical spray ignition description and should help in understanding the physics and chemistry of the process. it focused on the importance of transport mechanisms on individual fuel droplet ignition.

AD-A174 898

AD-A174 898 CONTINUED

DESCRIPTORS: (U) *FUEL SPRAYS, *IGNITION, ENERGY, GASES, MIXING, PHYSICS, PROBABILITY, SPRAYS, DIAMETERS, MEAN, HEAT, PLANAR STRUCTURES, SURFACES, TRANSPORT PROPERTIES, FUEL AIR RATIO, IGNITION LAG, PARTICLE SIZE, COMBUSTION, DISPERSIONS, VAPORS, CHEMISTRY, DROPS, RATIOS, HETEROGENEITY, MODELS, DISTRIBUTION, SIZES(DIMENSIONS)

IDENTIFIERS: (U) Combustible sprays, Spray ignition, PE61102F, WUAFOSR2308A2

DTIC REPORT BIBLIOGRAPHY

AD-A174 895 .8 10/0.20 4/0

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Mechanical Behavior of Saturated Soils - A Review.

DESCRIPTIVE NOTE: Annual rept. no. 10, 1 Feb 83-31 Jan 85,

JUN 85 143P

PERSONAL AUTHORS: Sandhu,Ranbir S. ;

REPORT NO. OSURF-715927-85-1

CONTRACT NO. AFOSR-83-0055

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-86-2095

UNCLASSIFIED REPORT

ABSTRACT: (U) Theories of mechanical behavior of saturated soils are reviewed. The discussion spans the classical approaches to quasi-static and dynamic response of deformable porous media as well as theories of mixtures and their application in geomechanics. Different approaches to description of motion of superposed continua, derivation of balance laws and development of constitutive relationships are compared. The notion of motion of the mixture as a single body is questioned. Alternative concepts of behavior of liquid-solid mixtures are considered. The role of thermodynamic principle in development of constitutive relationships is examined. Keywords: Balance laws; Constitutive relations; Consolidation; Flow through deformable porous media; Liquefaction; theories of mixtures.

DESCRIPTORS: (U) *SATURATION, *SOIL MECHANICS, *LIQUEFACTION, DEFORMATION, DYNAMIC RESPONSE, LIQUIDS, MECHANICAL PROPERTIES, MIXTURES, MOTION, POROUS MATERIALS, SOLIDS, THEORY, BALANCE, MULTIPHASE FLOW, SOIL MODELS, STRESS STRAIN RELATIONS, WAVE PROPAGATION

IDENTIFIERS: (U) *Saturated oils, Constitutive equations, Geomechanics, LPN-OSURF-715927/763420, PE61102F, WUAFOSR2307C1

AD-A174 895

SEARCH CONTROL NO. EVJ56L

AD-A174 889 .12 3/0.13 8/0

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) A Covariance Inequality for Coherent Structures.

DESCRIPTIVE NOTE: Technical rept.,

JUN 86 9P

PERSONAL AUTHORS: Joag-Dev,Kumar ;Proschan,Frank ;

REPORT NO. FSU-STATISTICS-M733

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2201

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper extends a basic result in reliability theory. The author show that the S-shaped property of the reliability function holds when the states of the components are associated; the earlier stronger hypothesis of independence among component states is unnecessarily strong. Keywords: random variables. (Author)

DESCRIPTORS: (U) *COVARIANCE, *RELIABILITY, COHERENCE, STRUCTURES, RANDOM VARIABLES, THEORY, INEQUALITIES

IDENTIFIERS: (U) *Reliability functions, Hypothesis testing, PE61102F, WUAFOSR2304A5

AD-A174 889

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 886 .12 4/0

PURDUE UNIV LAFAYETTE IN SCHOOL OF AERONAUTICS AND ASTRONAUTICS

(U) Controller Synthesis for Distributed Parameter Systems.

DESCRIPTIVE NOTE: Final rept. 15 May 82-14 Nov 84,

APR 86 135P

PERSONAL AUTHORS: Skelton,R. E. ;

CONTRACT NO. AFOSR-82-0209

PROJECT NO. 2304

TASK NO. K1

MONITOR: AFOSR
TR-86-2083

UNCLASSIFIED REPORT

ABSTRACT: (U) This research seeks to unify certain problems of distributed parameter control: model reduction, control, sensor/actuator selections/failure, and decentralized control. These topics are all related and are to be unified through the quadric performance metric with use of cost decomposition methods. The final research topic on model error estimation is required to male vernier adjustments after best models and controllers are developed, to absorb remaining modeling errors. During the period covered by the grant, 16 conference and journal research papers were written. Titles include: Computer Aided Design of Suboptimal LQG Controller, Cost Equivalent Realizations of Stochastic Processes, Component Cost Analysis of Large Scale Systems, Comments on Realizations and Reduction of Markovian Models for Nonstationary Data, and On the Selection of Controller Order for the Control of Linear Dynamic Systems.

DESCRIPTORS: (U) *PARAMETRIC ANALYSIS, *OPERATIONS RESEARCH, COMPUTER AIDED DESIGN, CONTROL, COST ANALYSIS, COSTS, DECENTRALIZATION, DECOMPOSITION, DISTRIBUTION, DYNAMICS, ERRORS, ESTIMATES, LINEAR SYSTEMS, MARKOV PROCESSES, PARAMETERS, REDUCTION, SELECTION, STOCHASTIC PROCESSES, SYNTHESIS, MATHEMATICAL MODELS

AD-A174 886

AD-A174 881 .12 2/0

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) A Theorem of I. Schur and its Impact on Modern Signal Processing,

86 23P

PERSONAL AUTHORS: Kailath,Thomas ;

CONTRACT NO. DAAG29-83-K-0028, AFOSR-83-0028

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR,ARO
TR-86-2199,23453.2-MA

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Operator Theory: Advances and Applications, v18 p10-30 1986.

ABSTRACT: (U) An algorithm of Schur for Characterizing power series that are bounded in the unit circle is shown to have applications to a variety of problems in science and engineering. These include speech analysis and synthesis, inverse scattering, decoding of error-correcting codes, synthesis of digital filters, modeling of random signals, Pade approximation for linear systems, and zero location of polynomials. We also demonstrate an intimate relation between Schur's algorithm and the recently introduced concept of displacement structure, which is fundamental to the construction of efficient procedures for factorization, inversion and eigenanalysis of matrices. It also has meaningful links with the theory of operators close to Hermitian and close to unitary. (Reprints).

DESCRIPTORS: (U) *ALGORITHMS, *STRUCTURAL PROPERTIES, *APPROXIMATION(MATHEMATICS), *SPEECH ANALYSIS, *ERROR CORRECTION CODES, *INVERSE SCATTERING, *SIGNAL PROCESSING, DISPLACEMENT, LINEAR SYSTEMS, REPRINTS, DIGITAL FILTERS, SYNTHESIS, CIRCLES, DECODING, MODELS, SIGNALS, POWER SERIES, OPERATORS(PERSONNEL), THEORY

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6

AD-A174 881

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 880 .20 11/0.22 2/0

BOSTON UNIV MA

(U) The Control Theory of Flexible and Articulated Spacecraft.

DESCRIPTIVE NOTE: Interim rept. 15 Apr 85-14 Apr 86,

MAY 86 45P

PERSONAL AUTHORS: Baillieul,John ;Levi,Mark ;

CONTRACT NO. AFOSR-85-0144

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2082

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes work done on the dynamics and control of flexible and articulated spacecraft. The combined dynamical effects of elasticity and a rotating reference frame have been explored for structure in a zero gravity environment. A simple yet general approach to modeling was developed, and applied to analyze the dynamics of a specific prototypical structure. The effects of energy dissipation were included and studied in depth for a model problem. Equilibria, bifurcations, and asymptotic stability were analyzed in some carefully chosen examples which capture the essential general features of nonlinear distributed parameter models of rotating elastic structures. Keywords: Classical mechanics; Rotating reference frames; Rotating elastic media.

DESCRIPTORS: (U) *SPACECRAFT, *CONTROL THEORY, *FLEXIBLE STRUCTURES, *ROTATION, ASYMPTOTIC SERIES, DISSIPATION, DISTRIBUTION, DYNAMICS, ELASTIC PROPERTIES, ENERGY, ENVIRONMENTS, FRAMES, MATHEMATICAL MODELS, METHODOLOGY, MODELS, NONLINEAR SYSTEMS, PARAMETERS, STABILITY, STRUCTURES, WEIGHTLESSNESS, CONTROL SYSTEMS, JOINTS, SPACE ENVIRONMENTS, BIFURCATION(MATHEMATICS), MECHANICS, EQUILIBRIUM(PHYSIOLOGY)

IDENTIFIERS: (U) Flexible spacecraft, Articulated

AD-A174 880

AD-A174 880 CONTINUED

spacecraft, Rotating reference frames, PE61102F, WUAFOSR2304A1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 878 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Some Recent Results in Nonlinear Filtering Theory with Finitely Additive White Noise.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 12P

PERSONAL AUTHORS: Kallianpur,G. ;

REPORT NO. TR-125

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2198

UNCLASSIFIED REPORT

ABSTRACT: (U) Nonlinear filtering theory has been developed over the last few decades, largely, as an application of stochastic calculus. The theory (which will be referred to below as the conventional or stochastic calculus theory) has led to many important new advances in the subject and, indeed, given rise to problems of interest to stochastic calculus itself. When it comes to statistical applications, however, the approach based on stochastic calculus has many shortcomings which originate from the use of the Wiener process as a model for noise. This point has been recognized by many writers and has led to attempts to create a pathwise or robust version of the theory this article presents a very brief outline of an alternative approach developed recently in collaboration with R.L. Karandikar. In this theory, the Wiener process is replaced by finitely additive (f.a.) Gaussian which noise in the filtering model in which we also assume the independence of signal and noise.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *MATHEMATICAL FILTERS, CALCULUS, STATISTICS, THEORY, WHITE NOISE, GAUSSIAN QUADRATURE, MATHEMATICAL MODELS

AD-A174 878

AD-A174 878 CONTINUED

IDENTIFIERS: (U) *Nonlinear Filtering, *Stochastic Calculus, Weiner Processes

AD-A174 878

DTIC REPORT BIBLIOGRAPHY

AD-A174 876 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Stochastic Evolution Equations with Values on the Dual of a Countably Hilbert Nuclear Space.

DESCRIPTIVE NOTE: Technical rept. Sep 85-Sep 86,

JUL 86 60P

PERSONAL AUTHORS: Kallianpur,G. ;Perez-Abreu,V. ;

REPORT NO. TR-145

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2197

UNCLASSIFIED REPORT

ABSTRACT: (U) The work begins a study of stochastic evolution equations (SEE) driven by nuclear space valued martingales. The existence and uniqueness of solutions of perturbed SEE's is also considered. An illustration of the equations treated here is the SEE obtained by Mitoma in connection with the central limit theorem for the propagation of chaos.

DESCRIPTORS: (U) **DIFFERENTIAL EQUATIONS, *STOCHASTIC PROCESSES, EVOLUTION(GENERAL), HILBERT SPACE, THEOREMS, PERTURBATIONS

IDENTIFIERS: (U) Martingales, Nuclear space, WUAFOSR2304A5, PE61102F

AD-A174 876

SEARCH CONTROL NO. EVJ56L

AD-A174 866 .9 3/0.12 6/0.14 2/0.20 7/0.20 9/0

MARYLAND UNIV COLLEGE PARK

(U) Department of Defense Instrumentation Award.

DESCRIPTIVE NOTE: Final rept. 1 Aug 84-1 Jul 85,

JUL 85 6P

PERSONAL AUTHORS: Destler,William W. ;

CONTRACT NO. AFOSR-84-0267

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-86-2031

UNCLASSIFIED REPORT

ABSTRACT: (U) These funds were used to purchase a complete fast digital data acquisition system now completely installed in the Charged Particle Beam Laboratory at the University of Maryland. This instrumentation, consisting of five channels of fast digitization (two donated by the University) controlled by a DEC 11/73 computer, is now assembled in a shielded room with trench access to all of the experiments underway in the laboratory. The projects of Department of Defense interest supported by this instrumentation are listed below: Propagation of Intense Charged Particle Beams into Vacuum, Propagation of short Burst, High Power Microwave Pulses through Neutral and Ionized Media, Free Electron Lasers Driven by Electromagnetic Pump Waves, and High Power Microwave Radiation from a Relativistic Backward wave oscillator.

DESCRIPTORS: (U) *ANALOG TO DIGITAL CONVERTERS, *ELECTROMAGNETIC PUMPS, *PARTICLE BEAMS, *MEDIA, *CHARGED PARTICLES, *FREE ELECTRON LASERS, *PROPAGATION, ACCESS, CHANNELS, ELECTROMAGNETIC RADIATION, HIGH POWER, INTENSITY, IONIZATION, LABORATORIES, MARYLAND, MICROWAVE EQUIPMENT, NEUTRAL, PULSES, RADIATION, RADIOFREQUENCY POWER, RUPTURE, SHIELDING, SHORT RANGE(TIME), SPACE(ROOM), TRENCHES, VACUUM

AD-A174 866

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 860 .8 7/0.8 8/0.12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Correlation Length and its Critical Exponents for Percolation Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 85-Sep 86,

JUL 86 10P

PERSONAL AUTHORS: Nguyen,B. G. ;

REPORT NO. TR-144

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2203

UNCLASSIFIED REPORT

ABSTRACT: (U) This document first defines the model and introduce the notation the author uses in this paper. A site percolation process in Z sub d (here d > or = 2) is a family of probability measures P sub p, P epsilon (0, 1) together with a collection of random variables eta: : Z sub d approx (0,1) such that under P sub p the eta's are independent and P sub p (eta)(x) = 1 = p. A site x is thought of being occupied (nonoccupied) if eta(x) = 1 (eta(x) = 0). We say that x is connected to y if there is a path of occupied sites connecting x and y; i.e. there is a sequence of sites x sub 0 =x, x sub 1, x sub 2,..., x sub n = y in Z sub d so that x sub i and x sub i + 2 are nearest neighbors and eta(x sub i) = 1 for every i = 0,1,2..., n. We denote this event by (x approaches limit of y). Let C sub 0 = (a : 0 approaches limit of x). We say that C sub 0 is the cluster containing 0.

DESCRIPTORS: (U) *PERCOLATION, *CORRELATION TECHNIQUES, INEQUALITIES, EXPONENTIAL FUNCTIONS, DECAY SCHEMES, COLLECTION, CORRELATION, LENGTH, RANDOM VARIABLES, SEQUENCES, SITES

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 860

AD-A174 853 .20 6/0

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCES

(U) Parallel Optical Data Processing.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-1 Feb 86,

AUG 86 60P

PERSONAL AUTHORS: Lee,Sing H. ;

CONTRACT NO. AFOSR-84-0336

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-86-2020

UNCLASSIFIED REPORT

ABSTRACT: (U) Optical computing has been effective at solving computationally difficult problems. Optical computing research has high risk, but high potential benefits. AFOR has had the lead role in basic optical computing research and must continue this role in coordination with other government and industrial funding. Current and future optical computing systems can be organized into a unified structure with five major components: input, processor array, interconnections, memory, output. Optics has great potential advantages in speed, bandwidth and parallelism, but electronics has the advantages of a well-developed technology. Basic research needs:-Materials - nonlinear, synthetic structures, processing element arrays - SMLs, interconnections/ memories - materials, devices, arrays, architectures/ algorithms - utilize parallelism.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *OPTICAL DATA, *PARALLEL PROCESSING, *OPTICAL PROCESSING, *COMPUTATIONS, PROCESSING EQUIPMENT, ALGORITHMS, ARCHITECTURE, ARRAYS, BENEFITS, DATA PROCESSING, HIGH RATE, OPTICAL EQUIPMENT, OPTICS, RISK, STRUCTURES, SYNTHETIC MATERIALS

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4

AD-A174 853

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 846 .20 8/0.20 10/0

LAWRENCE LIVERMORE NATIONAL LAB CA

(U) Relativist Calculation of Atomic N-Shell Ionization by Protons,

JUL 86 7P

PERSONAL AUTHORS: Chen,Mau H. ;Crasemann,Bernd ;

CONTRACT NO. F49620-85-C-0040

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-0923

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v34 n1 p87-92 Jul 86.

ABSTRACT: (U) Relativistic plane-wave Born-approximation calculations of cross sections for N shell ionization of Bi 83 and U 92 by protons with incident energies from 0.02 to 5 MeV are reported. The calculations were carried out by using Dirac-Hartree-Slater wave functions. Binding energy change and Coulomb deflection were taken into account. The relativistic cross sections are compared with values from nonrelativistic Hartree-Slater wave functions to study the effects oif relativity. A test calculation with hydrogenic wave functions yields very different results. The only available measurements (for W 74), revised with a corrected 4 d fluorescence yield, agree with present theoretical predictions for E sub 1 < or = 0.1 MeV but fall below theory by a factor of 6 above E sub 1 = 0.4 MeV. This glaring discrepancy invites further investigation. Keywords: Atomic physics; Ionization; Reprints.

DESCRIPTORS: (U) *BISMUTH, *URANIUM, *WAVE FUNCTIONS, *NUCLEAR SHELL MODELS, PLANE WAVES, DIFFERENTIAL CROSS SECTIONS, NUCLEAR PHYSICS, THEORY, IONIZATION, PROTONS, COMPUTATIONS, NUCLEAR BINDING ENERGY, DEFLECTION, HYDROGEN, WAVE FUNCTIONS, YIELD, MATHEMATICAL PREDICTION, REPRINTS

AD-A174 846 CONTINUED

IDENTIFIERS: (U) Born approximation, DIRAC HARTREE SLATER wave functions, AB inito calculations

AD-A174 846

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 831 .20 4/0

GRUMMAN CORP BETHPAGE NY CORPORATE RESEARCH CENTER

(U) On the Prediction of Highly Vortical Flows Using an Euler Equation Model.

DESCRIPTIVE NOTE: Final rept. 13 Jun 84-15 Jun 85,

FEB 86 63P

PERSONAL AUTHORS: Marconi,Frank ;

REPORT NO. RE-713

CONTRACT NO. F49620-84-C-0056

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2073

UNCLASSIFIED REPORT

ABSTRACT: (U) An investigation of the power of the Euler equations in the prediction of conical separated flows is presented. These equations are solved numerically for the highly vortical supersonic flow about circular and elliptic cones. Two sources of vorticity are studied; the first is the flow field shock system and the second is the vorticity shed into the flow field from a separating boundary layer. Both sources of vorticity are found to produce seperation and vortices. In the case of shed (i.e. , separation point) is determined empirically. Solutions obtained with both sources of vorticity are studied in detail, compared with each other, and with potential calculations and experimental data.

DESCRIPTORS: (U) *FLOW SEPARATION, *SUPERSONIC FLOW, *VORTICES, BOUNDARY LAYER, CIRCULAR, COMPUTATIONS, CONICAL BODIES, DIFFERENTIAL EQUATIONS, ELLIPSES, FLOW, FLOW FIELDS, MATHEMATICAL MODELS, SEPARATION, SHOCK TESTS, SOURCES, SUPERSONIC FLOW, VORTICES, MATHEMATICAL PREDICTION, SHOCK, MATHEMATICAL PREDICTION, VORTEX SHEDDING

IDENTIFIERS: (U) Vortical flow, Euler equations, PE61102F, WUAFOSR2307A1

AD-A174 831

AD-A174 826 .21 2/0

YALE UNIV NEW HAVEN CT HIGH TEMPERATURE CHEMICAL REACTION ENGINEERING LAB

(U) Transport Phenomena and Interfacial Kinetics in Multiphase Combustion Systems.

DESCRIPTIVE NOTE: Annual technical rept. 1 Dec 83-30 Nov 84,

JAN 85 12P

PERSONAL AUTHORS: Rosner,Daniel E. ;

CONTRACT NO. AFOSR-84-0034

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-2044

UNCLASSIFIED REPORT

ABSTRACT: (U) Research accomplishments under this grant include: (1) demonstration of several laser-based real-time optical techniques for measuring vapor-particle-deposition rates onto cooled surfaces in combustion gases; (2) demonstration that thermophoresis dominates the capture of soot particles by thermocouples in laminar flames and that this phenomenon can be exploited to infer both local soot volume fractions and local gas temperatures; (3) development of effective boundary layer computational methods and correlations for thermophoretically-modified small particle transport across laminar and turbulent boundary layers; and (4) extension of the recently developed microwave induced plasma emission spectroscopic (MIPES) method to follow boron surface gasification kinetics. Seven presentations and eight publications describing these techniques/findings are documented. Keywords: Aerosols; convective diffusion; Deposition; Energy transfer; catalysis; fouling; soot.

DESCRIPTORS: (U) *COMBUSTION PRODUCTS, *ENERGY TRANSFER, *COMBUSTION, *SOOT, METHODOLOGY, OPTICS, REAL TIME, PHASE, PARTICLES, TRANSPORT PROPERTIES, TEMPERATURE, EMISSION, MICROWAVES, PLASMAS(PHYSICS), THERMOCOUPLES, TURBULENT

AD-A174 826

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 826 CONTINUED

BOUNDARY LAYER, BORON, ENERGY CONVERSION, KINETICS, SURFACES, CATALYSIS, CONVECTION, DIFFUSION, DEPOSITION, FOULING, LAMINAR BOUNDARY LAYER, NUMERICAL METHODS AND PROCEDURES, COOLING, LAMINAR FLOW, AEROSOLS, REACTION KINETICS, LASER APPLICATIONS, DEPOSITION, PHASE TRANSFORMATIONS, VOLUME

IDENTIFIERS: (U) Multiphase combustion, Thermophoresis, WUAFOSR2308A2, PE61102F

AD-A174 826

AD-A174 825 .13 8/0

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Effects of Assuming Independent Component Failure Times, If They Are Actually Dependent, in a Series System.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 84-31 Oct 85,

NOV 85 132P

PERSONAL AUTHORS: Moeschberger,Melvin L. ;Klein,John P. ;

CONTRACT NO. AFOSR-82-0307

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-86-2042

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of this proposal is to investigate the robustness to departures from independence of methods currently in use in reliability studies when competing failure modes or competing causes of failure associated with a single mode are present in a series system. The first specific aim is to examine the error one makes in modeling a series system by a model which assumes statistically independent component lifetimes when in fact the component lifetimes follow some multivariate distribution. The second specific aim is to assess the effects of the independence assumption on the error in estimating component parameters from life tests on series systems. In both cases, estimates of such errors will be determined via mathematical analysis and computer simulations for several prominent multivariate distributions. A graphical display of the errors for representative distributions will be made available to researchers who wish to assess the possible erroneous assumption of independent competing risks. A third aim is to tighten the bounds on estimates of component reliability when the risks belong to a general dependence class of distributions (for example, positive quadrant dependence, positive regression dependence, etc.).

DESCRIPTORS: (U) *RELIABILITY, *SYSTEMS ANALYSIS,

AD-A174 825

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 825 CONTINUED

COMPUTER GRAPHICS, COMPUTERIZED SIMULATION, DISTRIBUTION, ESTIMATES, FAILURE, GRAPHICS, LIFE TESTS, MATHEMATICAL ANALYSIS, MULTIVARIATE ANALYSIS, PARAMETERS, QUADRANTS, REGRESSION ANALYSIS

IDENTIFIERS: (U) LPN-OSURF-714837, LPN-OSURF-763265, PE61102F, WUAFOSR2304A5

AD-A174 820 .20 4/0

TORONTO UNIV DOWNSVIEW (ONTARIO) INST FOR AEROSPACE STUDIES

(U) An Interferometric Investigation of the Regular to Mach Reflection Transition Boundary in Pseudostationary Flow in Air.

DESCRIPTIVE NOTE: Technical note,

APR 86 154P

PERSONAL AUTHORS: Wheeler,John ;

REPORT NO. UTIAS-TN-256

CONTRACT NO. AFOSR-82-0096

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2029

UNCLASSIFIED REPORT

ABSTRACT: (U) The regular (RR) to Mach reflection (MR) transition boundary in pseudostationary flow in air was investigated, with emphasis on the influence of the shock induced boundary layer. Nearly 100 experiments were conducted in the RR to MR transition line over a range of incident shock wave Mach number 1.1 M Ms < 6.5 by conducting experiments in hypervelocity shock tube. The wedge angles used were 42, 45, 47, and 48 deg. Initial pressures were kept as low to maximize viscous effects and ranged from 0.4 kPa to 100 kPa. A comparison was made between the boundary layer thickness, and the deviation of the transition boundary from inviscid theory. This difference is called the von Neumann paradox. The von Neumann paradox is due to viscous effects. The deviation of the RR to MR transition line from the detachment criterion boundary was found to increase with a drop in initial pressure, in a manner consistent with boundary layer theory. The effect of the end was boundary layer on the RR to MR transition line was more pronounced at low Mach number (Ms < 2), and a model is proposed to explain this behavior. Initial pressure was also found to influence the height of the Mach stem in MR. Lower

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 820 CONTINUED

initial pressure (with greater viscous effects) reduced the height of the Mach stem, which was found to be smaller than the inviscid prediction in all MR experiments. An explanation for the reduction in Mach stem height is suggested, but the causes was not thoroughly investigated. (Canada)

DESCRIPTORS: (U) *REFLECTION, *SHOCK WAVES, *BOUNDARY LAYER TRANSITION, BOUNDARY LAYER, THICKNESS, HYPERSONIC VELOCITY, SHOCK TUBES, INVISCID FLOW, CANADA, INTERFEROMETRY, TRANSITIONS, MACH NUMBER, REYNOLDS NUMBER

IDENTIFIERS: (U) Pseudostationary flow, WUAFOSR2307A1, PE61102F

AD-A174 820

AD-A174 803 .3 2/0.4 1/0.17 9/0

SRI INTERNATIONAL MENLO PARK CA

(U) The Analysis Phase of MITHRAS.

DESCRIPTIVE NOTE: Final rept. 1 Oct 82-30 Sep 85,

JUN 86 134P

PERSONAL AUTHORS: Wickwar,Vincent B. ;De La Beaujardiere, Odile ;Leger,Carol A. ;

CONTRACT NO. F49620-83-K-0005

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-86-2037

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) MITHRAS is a coordinated multiradar program to study the upper atmosphere. Its purpose is to examine the interactions among the magnetosphere, ionosphere, and thermosphere, as well as the phenomena that result from these interactions. It is based around a data set acquired by the Chatanika, Millstone Hill, and EISCAT incoherent-scatter radars between May 1981 and June 1982. A larger portion of this period was unique because it was the only time that three radars, well separated in local and magnetic time, operated together to probe the high-latitude region. The period was also unique because it coincided closely with solar maximum and the DE-2 spacecraft was available for correlative observations. To learn as much as possible from the observations, several tools were developed to improve the handling and analysis: a data-exchange tape format was developed, new display methods using color were implemented to present the data, F-region analysis procedures were extended, and binning procedures were developed to facilitate statistical analysis of the data. In addition, workshops were held so that the observations could be discussed and interpreted by the MITHRAS participants.

AD-A174 803

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 803 CONTINUED

DESCRIPTORS: (U) *MAGNETOSPHERE, *THERMOSPHERE, *UPPER ATMOSPHERE, *RADAR, F REGION, INCOHERENT SCATTERING, IONOSPHERE, MAGNETIC FIELDS, STATISTICAL ANALYSIS, TIME, WORKSHOPS

IDENTIFIERS: (U) WUAFOSR2310A2

AD-A174 802 .13 13/0

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) The Identification of a Distributed Parameter Model for a Flexible Structure,

AUG 86 46P

PERSONAL AUTHORS: Banks,H. T. ;Gates,S. S. ;Rosen,I. G. ; Wang,Y. ;

REPORT NO. LCDS-86-32

CONTRACT NO. AFOSR-84-0393

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-86-2034

UNCLASSIFIED REPORT

ABSTRACT: (U) A develop a computational method is developed for the estimation of parameters in a distributed model for a flexible structure. The structure we consider (part of the 'RPL experiment') consists of a cantilevered beam with a thruster and linear accelerometer at the free end. The thruster is fed by a pressurized hose whose horizontal motion effects the transverse vibration of the beam. The Euler-Bernoulli theory is used to model the vibration of the beam and treat the hose thruster assembly as a lumped or point mass dashpot spring system at the tip. Measurements of linear acceleration at the tip are used to estimate the hose parameters (mass, stiffness, damping) and a Voigt-Kelvin viscoelastic structural damping parameter for the beam using a least squares fit to the data. Spline based approximations are considered to the hybrid (coupled ordinary and partial differential equations) systems; theoretical convergence results and numerical studies with both simulation and actual experimental data obtained from the structure are presented and discussed.

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, MATHEMATICAL MODELS, ACCELERATION, ACCELEROMETERS, APPROXIMATION(MATHEMATICS), ASSEMBLY, CANTILEVER BEAMS,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 802 CONTINUED

COMPUTATIONS, CONVERGENCE, DAMPING, DISTRIBUTION, ESTIMATES, HORIZONTAL ORIENTATION, HOSES, LINEAR SYSTEMS, LINEARITY, MODELS, MOTION, NUMERICAL ANALYSIS, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, PRESSURIZATION, SIMULATION, SPLINES(GEOMETRY), STIFFNESS, THRUSTERS, TRANSVERSE, VIBRATION

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1

AD-A174 800 .9 1/0.12 1/0

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Digital Cauer-Type Ladders for Stable Filters,

MAY 86 5P

PERSONAL AUTHORS: Bistritz,Yuval ;

CONTRACT NO. AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-86-2047

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE International Symposium *on Circuits and Systems*, p688-689 May 86.

ABSTRACT: (U) The stability of digital ladder filters related to LC Cauer ladder low-pass filters by Bruton's LDI transformation is studied. Necessary and sufficient conditions for the digital LDI Cauer filter to be lossless and for a corresponding doubly terminated filter to be stable are derived. A concurrence relation between the stability and sampling rate requirements is shown for implementations by switched capacitors, by which appropriate sampling rate generally guarantee also the sufficiency condition for stability. Keywords include: Digital ladder filters, LC Cauer ladder, Low-pass filters, LDI transformation. (Reprints)

DESCRIPTORS: (U) *DIGITAL FILTERS, *SAMPLING, *LOW PASS FILTERS, RATES, FILTERS, STABILITY, REPRINTS, REQUIREMENTS, CAPACITORS, SWITCHING

IDENTIFIERS: (U) WUAFOSR2304A6, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 792 .14 2/0.17 6/0.23 3/0

SRI INTERNATIONAL MENLO PARK CA

(U) Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Sep 85-31 Aug 86,

OCT 86 21P

PERSONAL AUTHORS: Bahr,A. J. ;Rosengreen,A. ;

CONTRACT NO. F49620-84-K-0011

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-86-2025

UNCLASSIFIED REPORT

ABSTRACT: (U) It has been demonstrated that small single-turn printed loops can be used as sensors with sufficient sensitivity to be useful in NDE and robotics and that printed-circuit techniques facilitate the fabrication of arrays of small loops to provide electronic scanning with high spatial resolution. It has also been shown that deconvolution techniques improve the spatial resolution of such sensors in detecting edges and slots. Future research plans under this contract include developing a model for inductive sensor arrays; designing and building a horizontal-loop array with vertical connections; demonstrating electronic scanning in one, and perhaps two, dimension; and exploring the possibilities of arraying drivers as well as sensors.

DESCRIPTORS: (U) *LOOPS, *NONDESTRUCTIVE TESTING, *ROBOTICS, *ARRAYS, *DETECTORS, ARRAYS, ELECTRONIC SCANNERS, PLANNING, RESOLUTION, SPATIAL DISTRIBUTION, DETECTORS, HIGH RESOLUTION, PRINTED CIRCUITS, CONTROL, ROBOTS

IDENTIFIERS: (U) PE611021F, WUAFOSR2306A2, LPN-SRI-7711

IAC NO. NT-035689

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

AD-A174 792

AD-A174 792 CONTINUED

IAC SUBJECT TERMS: N--(U)SENSORS, ELECTROMAGNETIC TESTING, ARRAYS, ROBOTICS, CONTROL, IMAGING TECHNIQUES, SENSITIVITY, PRINTED CIRCUITS, DETECTION, RESOLUTION, DECONVOLUTION, FABRICATION, TEST EQUIPMENT, ELECTRONICS, SCANNING;

AD-A174 792

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 791

NORTHWESTERN UNIV EVANSTON IL DEPT OF MECHANICAL ENGINEERING

(U) Robust Asymptotic Tracking for Linear Systems with Unknown Parameters.

88 7P

PERSONAL AUTHORS: Schmitendorf,W. E. ;Barmish,B. R. ;

CONTRACT NO. AFOSR-85-0051, NSF-ECS84-15591,

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2018

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper considers a tracking problem for a linear system with uncertain parameters. The objective is t design a state feedback controller so that for all allowable parameter values the system internally stable and its output asymptotically tracks the command reference input. A controller having this property is termed a robust tracking controller. Conditions are given which can be used to design a robust tracking controller. The controller is linear with readily computable gains. The results are illustrated with an example. Keywords: Reprints; Uncertain systems; tracking; linear control problems.

DESCRIPTORS: (U) *TRACKING, FEEDBACK, LINEAR SYSTEMS, PARAMETERS, REPRINTS, CONTROL SYSTEMS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 791

AD-A174 785 .1 3/0.11 4/0.20 4/0

FAIRCHILD REPUBLIC CO FARMINGDALE NY

(U) Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 85-31 May 86,

JUL 86 117P

PERSONAL AUTHORS: Oyibo,Gabriel A. ;Weisshaar,Terrence A. ;

REPORT NO. AE002V7407

CONTRACT NO. F49620-85-C-0090

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-86-2040

UNCLASSIFIED REPORT

ABSTRACT: (U) In this preliminary investigation of an aeroelastically-induced constrained warping phenomenon for a composite (supermaneuverable type) aircraft wing, the wing is analytically modelled as a straight flat laminated plate using various forms of highly simplified aerodynamic loads. The free vibrations and (stability importance aspects are examined to obtain physical insights and determine their importance and/or design implications. An affine transformation concept and a non-dimensionalization scheme were used and an evolution of effective warping parameters with which to study this phenomenon was performed. The virtual work theorem and variational principles were used to derive the equations of motion based on the assumed wing displacements. Closed form solutions to the uncoupled versions of these equations were examined with the following results: 1) incorrect modelling of the warping phenomenon can leads to errors in excess of 80% for the analytically predicted aeroelastic characteristics of composite aircraft wings; 2) accurate modelling of the warping phenomenon is particularly important for wings with mass coupling or elastic coupling (e.g., wings aeroelastically tailored

AD-A174 785

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 785 CONTINUED

using elastic coupling) and for higher vibration modes; 3) neglect of the warping constraint can result in either under- or overpredicted analytical results and lead to incorrect identification of aeroelastic divergence modes. The existence of closed-form free vibrations solutions for composite wings with elastic coupling and constraint of warping was established.

DESCRIPTORS: (U) *AEROELASTICITY, *COMPOSITE AIRCRAFT, *COMPOSITE WINGS, *VIBRATION, AIRCRAFT, WINGS, COUPLING(INTERACTION), ELASTIC PROPERTIES, EQUATIONS OF MOTION, SOLUTIONS(GENERAL), EQUATIONS, FLAT PLATE MODELS, MANEUVERABILITY, COMPOSITE MATERIALS, TRANSFORMATIONS(MATHEMATICS), BENDING, FLUTTER, MASS, AERODYNAMIC LOADING, SIMPLIFICATION, OPTIMIZATION, VARIATIONAL PRINCIPLES, DISPLACEMENT

IDENTIFIERS: (U) Supermaneuverable aircraft, Aeroelastic tailoring, Unsteady aerodynamics, Structural dynamics, Affine transformations, PE61102F, WUAFOSR2302B1

AD-A174 784 .11 3/0

CASE WESTERN RESERVE UNIV CLEVELAND OH DEPT OF METALLURGY AND MATERIALS SCIENCE

(U) A Fundamental Study of the Bonding of Thermal Barrier Coatings.

DESCRIPTIVE NOTE: Final (annual) rept. 15 Jun 82-30 Nov 85,

JUN 86 70P

PERSONAL AUTHORS: Mitchell,T. E. ;Heuer,A. H. ;

CONTRACT NO. AFOSR-82-0227

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-86-2013

UNCLASSIFIED REPORT

ABSTRACT: (U) Two layer thermal barrier coatings are currently being developed for extending the performance of nickel base superalloy gas turbine engines. The best materials reported to data comprise a Ni-Cr-Al-Y bond coat and a Y2O3 partially stabilized ZrO2 (Y-PSZ) thermal barrier coat. The Y level of both the bond coat and the thermal barrier coat have been studied empirically but the fundamental factors that govern optimization of the thermal barrier system are not well understood. Optimized systems perform remarkably well during high temperature exposure and thermal cycling but failure still tends to occur by radial cracking in the ceramic coat and circumferential cracking at the various metal/ceramic interfaces. Two fundamental aspects of the behavior are discussed: firstly, phase stability in the zirconia-yttria system itself, particularly the desirable tetragonal phase, and secondly, the nature of the important zirconia-alumina interface which forms during oxidation of the underlying bond coat. The results of this research are described briefly below and in the various appendices.

DESCRIPTORS: (U) *CERAMIC COATINGS, *METAL COATINGS, *BARRIER COATINGS, EXPOSURE(GENERAL), HIGH TEMPERATURE,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 784 CONTINUED

OPTIMIZATION, OXIDATION, CRACKING(FRACTURING), RADIAL STRESS, THERMAL INSULATION, CYCLES, HEATING, CERAMIC MATERIALS, INTERFACES, METALS, PHASE, STABILITY, THERMAL INSULATION, NICKEL ALLOYS, CHROMIUM, ALUMINUM, YTTRIUM, SUPERALLOYS, GAS TURBINES

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2

AD-A174 784

AD-A174 781 .12 1/0

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Bifurcations into Pathology for Hamiltonian Systems.

JAN 86 79P

PERSONAL AUTHORS: Mischaikow,Konstantin ;

REPORT NO. LCDS-86-24

CONTRACT NO. DAAG29-83-K-0029, AFOSR-84-0378

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2033

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper presents a geometric analysis of bifurcations leading to chaos for Hamiltonian systems with two degrees of freedom of the form x-dot = y, y-dot = -gradient V(x). Two bifurcation parameters are considered. One is the energy level and the other is an angle, Psi, between two homoclinic orbits. Though global non-linearities are necessary, the results are obtained by local analysis of the flow near the origin where it is assumed that (D-sq)V(0) = I, the 2 x 2 identity matrix. For a fixed energy level it is shown that as Psi decreases through 90 deg the two homoclinic orbits bifurcate into two homoclinic orbits, a periodic orbit, and connecting orbits. These orbits can then be used to define a compact region in R supercript 4. Now treating the energy as a parameter value the trajectory of orbits passing through this compact region can be described using symbolic dynamics. In this case it is shown that a single periodic orbit bifurcates into three periodic orbits whose stable and unstable manifold intersect transversely.

DESCRIPTORS: (U) *BIFURCATION(MATHEMATICS), ENTROPY, TRAJECTORIES, DEGREES OF FREEDOM, DYNAMICS, ENERGY LEVELS, GLOBAL, HAMILTONIAN FUNCTIONS, JOINING, NONLINEAR SYSTEMS, ORBITS, PARAMETERS, STABILITY, TRAJECTORIES, VALUE

AD-A174 781

AD-A174 781 CONTINUED

IDENTIFIERS: (U) *Manifolds(Mathematics), Homoclinic orbits, chaos

AD-A174 780 .11 2/0

MASSACHUSETTS INST OF TECH CAMBRIDGE GAS TURBINE AND PLASMA DYNAMICS LAB

(U) Fluid Dynamic - Structural Interactions of Labyrinth Seals.

DESCRIPTIVE NOTE: Final rept. 1 Dec 83-31 Dec 84,

AUG 86 40P

PERSONAL AUTHORS: Martinez-Sanchez,Manuel ;Dugundji,John ;

CONTRACT NO. AFOSR-83-0034

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-86-2039

UNCLASSIFIED REPORT

ABSTRACT: (U) Work is described on a continuing investigation into the fluid dynamic and structural interactions of labyrinth seals. Three major areas are considered namely, (a) design and construction of a realistic labyrinth seal test rig to measure stiffness and damping forces in seals, (b) further development of an analytic labyrinth seal test model and its characteristics, and (c) formulation of a structural dynamic rotor system model including labyrinth seal forces and their application to the High Pressure Fuel Turbopump of the Space Shuttle main engine. Keywords: Labyrinth Seals; Force Coefficients; Rotor Dynamics.

DESCRIPTORS: (U) *SEALS(STOPPERS), COEFFICIENTS, DAMPING, DYNAMICS, FLUID DYNAMICS, FLUIDS, FUELS, HIGH PRESSURE, INTERACTIONS, LOADS(FORCES), ROCKET ENGINES, ROTORS, SPACE SHUTTLES, STIFFNESS, STRUCTURES, TEST EQUIPMENT, TURBOPUMPS, TURBOMACHINERY

IDENTIFIERS: (U) *Labyrinth seals, PE61102F, WUAFOSR230281

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 777 .12 3/0

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Tests Conditional on Imbalance with Biased Coin Designs.

DESCRIPTIVE NOTE: Technical rept.,

JUL 86 22P

PERSONAL AUTHORS: Hollander,Myles ;Pena,Edsel ;

REPORT NO. FSU-STATISTICS-M734, TR-86-189-AFOSR

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2019

UNCLASSIFIED REPORT

ABSTRACT: (U) Distributional properties of the treatment assignment variables T sub 1, ..., T sub n under Efron's (1971) biased coin design are derived. These properties are conditional on the terminal imbalance of the treatment allocation. Recursive procedures are presented for obtaining the conditional moments of T sub 1, ..., T sub n. Based on these results, large-sample test statistics are proposed for the randomization test of the null hypothesis of no treatment difference. In contrast to Efron's test statistic, the approximations herein proposed are applicable when there is a treatment allocation imbalance. Keywords: markov chains; chemical tests; conditional means and covariances; computerized simulation.

DESCRIPTORS: (U) *RECURSIVE FUNCTIONS, *BIOSTATISTICS, *MARKOV PROCESSES, BIAS, CHEMICAL ANALYSIS, HYPOTHESES, NULLS(AMPLITUDE), COMPUTERIZED SIMULATION, MOMENTS, COVARIANCE, STATISTICAL TESTS

IDENTIFIERS: (U) Markov chains, Coin design, PE61102F, WUAFOSR2304A5

AD-A174 777

AD-A174 773 .5 8/0

ROCKEFELLER UNIV NEW YORK

(U) Visual Temporal Filtering and Intermittent Visual Displays.

DESCRIPTIVE NOTE: Final progress rept. 1 Sep 84-30 Jun 86,

AUG 86 8P

PERSONAL AUTHORS: Shapley,Robert ;

CONTRACT NO. AFOSR-84-0278

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-86-2026

UNCLASSIFIED REPORT

ABSTRACT: (U) The initial objective of this project was to investigate the relation between the emporal filtering properties of visual neurons and the performance of human observers when they view intermittent visual displays, e. g. video screens. The scope of the project was reduces by the support level set by AFOSR to focus just on human observers and to omit any experiments on neurons in experimental animals. Specific aims of the project initially included the design and fabrication of a variable-raster-rate electro-optic display, and the use of this novel device to measure the contrast sensitivity function at different raster rates. These two specific aims have been reached and are described in the full report.

DESCRIPTORS: (U) *VISUAL AIDS, *PSYCHOPHYSICS, ANIMALS, FILTERS, DISPLAY SYSTEMS, RASTERS, RATES, NERVE CELLS, VISION, CONTRAST, SENSITIVITY, HUMANS, OBSERVERS, PERFORMANCE(HUMAN)

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5

AD-A174 773

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 766 .9 3/0

IOWA UNIV IOWA CITY

(U) Support of the International Laser Science Conference (1st) Held in Dallas, Texas on 18-22 November 1985.

DESCRIPTIVE NOTE: Final rept. 8 Nov 85-7 May 86,

MAY 86 5P

PERSONAL AUTHORS: Stwalley,William C. ;

CONTRACT NO. AFOSR-86-0060

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-86-2021

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser Science is an emerging technical area with a stong interdisciplinary flavor. It is based on atomic and molecular physics, chemical physics, condensed matter physics, optical physics and engineering, plasma physics, physical chemistry, photochemistry, materials science and engineering, electrical engineering, gaseous electronics, quantum electronics, and electro-optics. At the core of laser science are the mechanisms of the lasers themselves and the interaction of the laser photons with matter (spectroscopy and photoprocesses). Surrounding this core is the wide spectrum of scientific applications of lasers, not only in the disciplines mentioned above, but also in virtually every other area of science and technology. The primary purpose of the conference is to survey annually both the laser and spectroscopy/photoprocesses core areas and a wide variety of selected scientific applications of lasers.

DESCRIPTORS: (U) *LASER APPLICATIONS, PHYSICS, ELECTRICAL ENGINEERING, ELECTRONICS, GASES, LASERS, MOLECULAR STRUCTURE, PHOTOCHEMICAL REACTIONS, SYMPOSIA, OPTICS, PHYSICAL CHEMISTRY, PLASMAS(PHYSICS), QUANTUM ELECTRONICS, SPECTROSCOPY

IDENTIFIERS: (U) Chemical physics, PE61102F, WUAFOSR2301A1

AD-A174 766

AD-A174 765 .20 5/0.20 8/0

ARGONNE NATIONAL LAB IL

(U) The Gordon Research Conference on Electron Spectroscopy Held in Wolfeboro, New Hampshire on 14-18 July 1986.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-31 Dec 86,

JUL 86 17P

PERSONAL AUTHORS: Dehmer,Joseph L. ;Pierce,Daniel T. ;

CONTRACT NO. AFOSR-86-0188

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR TR-86-2023

UNCLASSIFIED REPORT

ABSTRACT: (U) The scope of the electron spectroscopy conference covers a range of modern techniques too numerous to mention, including various combinations of excitation sources (synchrotron radiation, laser radiation, electron beams, heavy ion beams, metastable atoms, etc.), targets (free atoms and molecules, adsorbed atoms and molecules, clusters, surfaces, solids, liquids and interfaces, etc.), and detectors (energy, ejection-angle, spin analyzers, often in coincidence with another observation channel, etc.). The conference it uses electron spectroscopy as common thread to draw together and focus diverse approaches to frontier research topics. Especially stimulating and fruitful exchanges occur across the gas phase/condensed matter boundary and between basic and applied sciences. The program is presented.

DESCRIPTORS: (U) *ELECTRON SPECTROSCOPY, ADATOMS, DETECTORS, LASER BEAMS, MOLECULES, SOLIDS, RADIATION, EXCITATION, SOURCES, ELECTRON BEAMS, HEAVY IONS, METASTABLE STATE, CHANNELS, OBSERVATION, ANALYZERS, PARTICLE ACCELERATOR TARGETS, PHASE TRANSFORMATIONS, SPIN STATES

IDENTIFIERS: (U) Program(Schedule)., WUAFOSR2301A4,

AD-A174 765

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 765 CONTINUED

PE61102F

AD-A174 764 .7 5/0.9 3/0

ARGONNE NATIONAL LAB IL ENVIRONMENTAL RESEARCH DIV

(U) The Gordon Research Conference on Multiphoton Processes Held in New London, New Hampshire on 9-13 June 1986.

DESCRIPTIVE NOTE: Final rept.,

JUN 86 18P

PERSONAL AUTHORS: Dehmer,Patricia M. ;Johnson,Philip M. ;

CONTRACT NO. AFOSR-86-0186

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR TR-86-2022

UNCLASSIFIED REPORT

ABSTRACT: (U) The program coverd all aspects of Multiphoton Processes in atoms and molecules. There were sessions devoted to multiphoton ionization of atoms, multiphoton ionization in intense laser fields, multiphoton ionization and dissociation processes in small molecules, multiphoton dissociation processes in larger molecules (including picosecond processes), and general interest sessions. The complete Conference program is appended.

DESCRIPTORS: (U) *PHOTODISSOCIATION, *LASER PUMPING, DISSOCIATION, MOLECULES, IONIZATION, PHOTONS, INTENSITY, SYMPOSIA, LASERS

IDENTIFIERS: (U) Multiphoton processes, Picosecond time, Program(Schedule), PE61102F, WUAFOSR2301A4

AD-A174 765

AD-A174 764

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 763 .20 4/0.21 2/0

CORNELL UNIV ITHACA NY

(U) Numerical Experiments on Turbulent Mixing.

DESCRIPTIVE NOTE: Annual rept. 16 Jan 85-15 Jan 86,

JUN 86 5P

PERSONAL AUTHORS: Pope,S. B. ;

CONTRACT NO. AFOSR-85-0083

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2045

UNCLASSIFIED REPORT

ABSTRACT: (U) In turbulent combustion, mixing by molecular transport is an essential process that is not well understood. Because mixing occurs on the smallest length and time scales it is difficult to study experimentally. Instead, we are starting a study based on the direct numerical simulation of turbulence, initially for a conserved passive scalar in homogeneous isotropic turbulence. The Eulerian velocity and scalar fields are calculated from the exact evolution equations, and both Eulerian and Lagrangian statistics are deduced from the computed fields. A particle tracking scheme, need to extract Lagrangian information, has been implemented and is undergoing testing. In addition, in order to study processes in stationary turbulence, a forcing algorithm has been developed and implemented, and is being tested.

DESCRIPTORS: (U) *MIXING, *TURBULENCE, *COMBUSTION, ALGORITHMS, EQUATIONS, EVOLUTION(GENERAL), MOLECULAR PROPERTIES, TRANSPORT PROPERTIES, PARTICLES, TRACKING, SCALAR FUNCTIONS, TURBULENT FLOW, MATHEMATICAL MODELS, NUMERICAL ANALYSIS, HOMOGENEITY, ISOTROPISM, NUMERICAL METHODS AND PROCEDURES, PASSIVE SYSTEMS, SCALE, TIME, COMPUTERIZED SIMULATION, TIME SERIES ANALYSIS

IDENTIFIERS: (U) Turbulent combustion, Forcing algorithms, Turbulent mixing, Scalar mixing, PE61102F, WUAFOSR2308A2

AD-A174 763

AD-A174 758 .12 3/0

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) On the Existence and Uniqueness of Invariant Measure for Continuous Time Markov Processes,

APR 86 25P

PERSONAL AUTHORS: Stettner,Lukasz ;

REPORT NO. LCDS-86-18

CONTRACT NO. AFOSR-85-0315

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2032

UNCLASSIFIED REPORT

ABSTRACT: (U) The paper attempt to find fairly general conditions under which the existence and uniqueness of invariant measure is guaranteed. The obtained results are new or generalize at least slightly known. The author introduces a terminology: weak, strong Harris, strong recurrence. Two Sections concern general standard processes. Are Section restricts it to Feller or strong Feller standard processes. Three examples are considered to illustrate possible unpleasant situations one can meet in general theory.

DESCRIPTORS: (U) *MARKOV PROCESSES, *INVARIANCE, CONTINUOUS PROCESSING, THEORY, TIME, TIME STUDIES

IDENTIFIERS: (U) Existence theorems, Uniqueness theorems, PE61102F

AD-A174 758

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 754 .8 7/0.8 11/0.17 10/0

SCRIPPS INSTITUTION OF OCEANOGRAPHY LA JOLLA CA

(U) Analysis of MSS (Marine Seismic System) and OBS (Ocean Bottom Seismograph) Data Collected during the NGENDEI Seismic Experiment.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 83-30 Jun 86,

AUG 86 577P

PERSONAL AUTHORS: Orcutt,John A. ;

CONTRACT NO. AFOSR-84-0043, DARPA Order-4983

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-86-1091

UNCLASSIFIED REPORT

ABSTRACT: (U) Results of the data analysis employing data collected during the NGENDEI Seismic Experiment in the southwest Pacific Ocean are presented. This experiment tested the DARPA Marine Seismic System (MSS) and verified the improved signal-to-noise ratio achieved by burying the instrument within the oceanic crust. Generally, all the goals of the experiment were achieved. The experiment, which took place on the Deep Sea Drilling Project Leg 91, was designed to test the MSS in a realistic environment near an active submarine trench. The Scripp's ship, the R/V Melville, was used in addition to the D/V Glomar Challenger for tasks related to site surveying, ocean bottom seismograph (OBS) deployment and refraction shooting. Deployment of an autonomous recording package on the seafloor was successful. The OBS's launched several times during the course of the experiment operated correctly in all instances including the 45 day teleseismic recording phase at the end. The MSS recording packages as well as the six OBS's were recovered at the end of the experiment. The MSS was left in the borehole and the coaxial cable was terminated in a dummy load. The mooring system used for recovery was redeployed in the event a future experiment became necessary or desirable.

AD-A174 754

AD-A174 754 CONTINUED

DESCRIPTORS: (U) *MARINE GEOPHYSICS, *SEISMIC DATA, *DATA REDUCTION, SUBMARINE TRENCHES, GEOLOGICAL SURVEYS, ANALOG TO DIGITAL CONVERTERS, ADDITION, COAXIAL CABLES, DATA PROCESSING, DEEP OCEANS, DRILLING, MOORING, OCEAN BOTTOM, OCEANIC CRUST, SEISMIC WAVES, SEISMOLOGY, SIGNAL TO NOISE RATIO, SITES

IDENTIFIERS: (U) Ngendei Experiment, MSS(Marine Seismic system), WUAFOSR2309A1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 752 .20 2/0.20 5/0

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DAVEY LAB

(U) Energy- and Angle-Resolved Detection of Neutral Atoms Desorbed from Ion Bombarded Single Crystals. Rh(111) and p(2x2)O/Rh(111).

86 9P

PERSONAL AUTHORS: Winograd,N. ;Kobrin,P. H. ;Schick,G. A. ;Singh,J. ;Baxter,J. P. ;

CONTRACT NO. AFOSR-85-0028

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-87-0501

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Surface Science, v178 pL817-L824 1986

ABSTRACT: (U) Measurements of energy- and angle-resolved distributions of neutral atoms desorbed from ion-bombarded single crystals are obtained using a novel multiphoton resonance ionization scheme. Experimental results are compared successfully to molecular dynamics calculations of the ion/solid collision event. This comparison suggests that the distributions from Rh (111) are sensitive to the crystal structure of the top atomic layer. Calculated distributions match experimental ones when oxygen atoms are assumed to adsorb in 3-fold hollow (c-site) bonding configurations.

DESCRIPTORS: (U) *RHENIUM, *SINGLE CRYSTALS, *ION BOMBARDMENT, *DESORPTION, BONDING, CONFIGURATIONS, IONS, SOLIDS, IONIZATION, PHOTONS, RESONANCE, ATOMS, OXYGEN, CRYSTAL STRUCTURE, COMPUTATIONS, DYNAMICS, MOLECULAR PROPERTIES, NEUTRAL, ATOMS, CHEMICAL BONDS, REPRINTS

IDENTIFIERS: (U) Ion molecular interactions, PE61102F, WUAFOSR2303A2

AD-A174 751 .20 4/0

NIELSEN ENGINEERING AND RESEARCH INC MOUNTAIN VIEW CA

(U) Fundamental Study of Jet Flows.

DESCRIPTIVE NOTE: Final rept. 1 Mar 85-30 Jun 86,

JUN 86 33P

PERSONAL AUTHORS: Nixon,David ;

REPORT NO. NEAR-TR-364

CONTRACT NO. F49620-85-C-0055

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-86-2051

UNCLASSIFIED REPORT

ABSTRACT: (U) The physics of some problems that arise in impinging jet flows have been investigated using a Very Large Eddy Simulation (VLES) of the Navier Stokes equations. The problems that have been examined include the upwash fountain covered by the collision of two walljets, possible causes of a Reynolds number scaling in the suck down phenomena and possible flow resonance. The effects of heat were also studied. It was found that the VLES technique can help explain certain aspects of jet flows. Keywords: Jet Flows; Turbulence.

DESCRIPTORS: (U) *JET FLOW, HEAT, IMPINGEMENT, NAVIER STOKES EQUATIONS, REYNOLDS NUMBER, SCALING FACTORS, EDDIES(FLUID MECHANICS), SIMULATION, FLOW, RESONANCE, TURBULENCE

IDENTIFIERS: (U) VLES(Very Large Eddy Simulation), Upwash, WUAFOSR2307A1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 750 .6 11/0.21 4/0

WRIGHT STATE UNIV DAYTON OHIO

(U) A Study of the Toxicity of the Metabolites of the Cruise Missile Fuel JP-10 on Several Animal Species.

DESCRIPTIVE NOTE: Final rept. (annual) 15 Sep 85-14 Sep 86,

SEP 86 19P

PERSONAL AUTHORS: Serve',M. P. ;

REPORT NO. WSU-85-042

CONTRACT NO. AFOSR-85-0350

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-86-2028

UNCLASSIFIED REPORT

ABSTRACT: (U) Groups of male and female Fischer 344 rats, C-57-BL mice and Syrian Golden hamsters were dosed with 5-hydroxy-JP-10 and 5-keto-JP-10, the metabolites of the cruise missile fuel JP-10, in order to study their toxicity. 5-Hydroxy-JP-10 proved to be an extremely toxic central nervous system depressant. The effects of 5-hydroxy-JP-10 on weight gain appeared to be most pronounced in the male rat. 5-Keto-JP-10, because it is absorbed less readily than 5-Hydroxy-JP-10, appeared to be relatively non-toxic. Neither of the JP-10 metabolites produced nephrotoxic effects in the doses administered.

DESCRIPTORS: (U) *JET ENGINE FUELS, *TOXICITY, *METABOLITES, MALES, RATS, DOSAGE, HAMSTERS, GAIN, WEIGHT, DOSE RATE, CNS DEPRESSANTS, MICE, KETONES, CRUISE MISSILES

IDENTIFIERS: (U) JP-10 fuel, Nephrotoxicity, Renal damage

AD-A174 750

AD-A174 749 .8 10/0.20 11/0

APPLIED RESEARCH ASSOCIATES INC SOUTH ROYALTON VT NEW ENGLAND DIV

(U) Experimental and Theoretical Response of Multiphase Porous Media to Dynamic Loads.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 Jul 85-1 Jul 86,

AUG 86 297P

PERSONAL AUTHORS: Kim,Kwang J. ;Blouin,Scott E. ;Timian, David A. ;

REPORT NO. ARA-5967-86

CONTRACT NO. F49620-85-C-0102

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-86-0665

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summerizes the current status of a combined experimental and theoretical investigation of the response of multiphase porous media to dynamic loading. This completes the first year of a planned three year investigation. Under the experimental portion, laboratory test were devised and conducted to measure the compressibility of soil and rock grains containing a large percentage of microporosity. Test were also developed to model liquefaction due to uniaxial strain loadings and to measure the amount of late-time consolidation as a function of the loading parameters. Finally, a test apparatus to measure fluid friction and energy absorption in porous media under specified flow conditions, including laminar, transient, and turbulant, was designed and constructed. This is currently undergoing evaluation. Under the theoretical portion of the work, derivations and computational algorithms to model the response of saturated soils and rocks to uniaxial and hydrostatic compressional loads were developed. The general purpose two-phrase code TPDAPII was completely revised to include more realistic plastic and elasto-plastic material models and more efficient

AD-A174 749

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 749 CONTINUED

computational algorithms. Lastly, theoretical derivations were completed for inclusion in the general purpose multiphase code MPDAP, to be written during the following year's effort.

DESCRIPTORS: (U) *SOIL MECHANICS, *DYNAMIC LOADS, *POROUS MATERIALS, POROSITY, PHASE, RESPONSE, SATURATION, SOILS, THEORY, AXES, STRAIN(MECHANICS), LIQUEFACTION, POROUS MATERIALS, TEST EQUIPMENT, COMPRESSIVE PROPERTIES, ALGORITHMS, COMPUTATIONS, MATHEMATICAL MODELS, DYNAMIC LOADS, CODING, ELASTIC PROPERTIES, PLASTIC PROPERTIES, FLOW, LABORATORY TESTS, FLUIDS, SATURATION, COMPUTER PROGRAMMING

IDENTIFIERS: (U) TPDAPII computer program, MPDAP computer program, WUAFOSR2302C1

AD-A174 749

AD-A174 743 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Covariate Measurement Error in Logistic Regression.

DESCRIPTIVE NOTE: Technical rept. Aug 85-Aug 86,

85 18P

PERSONAL AUTHORS: Stefanski,Leonard A. ;Carroll,Raymond J. ;

CONTRACT NO. F19620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2017

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The Annals of Statictics, v13 n4 p1335-1351 1985.

ABSTRACT: (U) In a logistic regression model when covariates are subject to measurement error the naive estimator, obtained by regressing on the observed covariates, is asymptotically biased. This reprint introduces a bias-adjusted estimator and two estimators appropriate for normally distributed measurement errors - a functional maximum likelihood estimator and an estimator which exploits the consequences of sufficiency. The four proposals are studied asymptotically under conditions which are appropriate when the measurement error is small. A small Monte Carlo study illustrates the superiority of the measurement-error estimators in certain situations.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *REGRESSION ANALYSIS, DISTRIBUTION, ERRORS, LOGISTICS, MAXIMUM LIKELIHOOD ESTIMATION, MEASUREMENT, MONTE CARLO METHOD, REPRINTS, ESTIMATES, COVARIANCE

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 743

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 738 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Continuity of Gaussian Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 85-Sep 86,

AUG 86 25P

PERSONAL AUTHORS: Samorodnitsky,Gennady ;

REPORT NO. TR-149

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 22304

TASK NO. A5

MONITOR: AFOSR
TR-86-2043

UNCLASSIFIED REPORT

ABSTRACT: (U) This document gives sufficient conditions for local continuity of the isonormal process L at some point of its parameter set. Since a Gaussian process, defined on a compact parameter space, that is a.s. continuous at each point is sample continuous, the result can be applied to the problem of general sample continuity of Gaussian processes. It is shown that sufficient conditions are strictly weaker than the classical sufficient conditions for sample continuity.

DESCRIPTORS: (U) *STATISTICAL PROCESSES, GAUSSIAN QUADRATURE, PARAMETERS, CONTINUITY, ENTROPY, COVARIANCE, HILBERT SPACE

IDENTIFIERS: (U) *Isonormal processes, Metric entropy, PE61102F, WUAFOSR2304A5

AD-A174 738

AD-A174 736 .14 2/0

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF MATHEMATICS STATISTICS AND COMPUTER SCIENCE

(U) Design of Experiments and Reliability Models.

DESCRIPTIVE NOTE: Final rept. 1 Jul 80-31 Jul 85,

JAN 86 14P

PERSONAL AUTHORS: Hedayat,A. ;

CONTRACT NO. AFOSR-80-0170

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-86-0379

UNCLASSIFIED REPORT

ABSTRACT: (U) This is a final report of scientific achievements and activities sponsored by U.S. Air Force Office of Scientific Research under contract AFOSR 80-0170 as of July 31, 1985. Research activities have been concentrated on two main areas: Design of experiments and Reliability. Research on design of experiments relates directly to problems of data collection and analysis relevant to virtually all scientific experimentations. There is a strong need in the Air Force to reduce costs and save time in the collection and analysis of large amounts of data, such as communication, engineering, equipment testing, and aerospace medicine data. The reduction in costs and time should be done clearly without any damage to the statistical quality of the data being collected and analyzed. The research problems not only add to our store of knowledge about the multiple facets of data collection and data analysis in general, but these have immediate applications to many important problems with which the United States Air Force is faced. The main research emphasis has been to obtain designs which are efficient, easily applicable and yet meet the budgetary constraints.

DESCRIPTORS: (U) *RELIABILITY, *EXPERIMENTAL DESIGN, MATHEMATICAL MODELS, AIR FORCE RESEARCH, DATA PROCESSING, AEROSPACE MEDICINE, COSTS, DATA ACQUISITION, QUALITY,

AD-A174 736

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 736 CONTINUED

RELIABILITY, STATISTICS, TEST METHODS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304K3

AD-A174 733 .12 2/0

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) A Comparison of Stability and Convergence Properties of Techniques for Inverse Problems,

JAN 86 75P

PERSONAL AUTHORS: Banks,H. T. ;Iles,D. W. ;

REPORT NO. LCDS-86-3

CONTRACT NO. AFOSR-84-0398, NSF-MCS85-04316

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-86-2036

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper demonstrates severe problems in some instances with using an unconstrained algorithm to estimate the parameter q. When modified, either by regularizing the problem using Tikhonov regularization or by constraining the estimate set the algorithm does give good estimates. Unlike the unconstrained algorithm, both the Tikhonov and constrained algorithms are stable with respect to increasing M while holding N fixed. However as N is increased the estimates from the Tikhonov algorithm do not improve as much as do those of the constrained algorithm. The Tikhonov estimates are biased by the regularization of the cost functional, and never show all the detail of q when q has significant variation. Both the constrained and Tikhonov estimation algorithms are stable with respect to systematic errors in the input data, while, except when N is large, the unconstrained algorithm fails to give good results on even the exact data. For both the Tikhonov and constrained algorithms there are parameters which affect the algorithm's performance. For the constrained algorithm suitable constraints must be found while for the Tikhonov algorithm suitable values of a and b must be found. The constrained algorithm has the advantage that the constraints used here, i.e. limits on the slope of q, have an obvious meaning, and so may well be known in

AD-A174 733 CONTINUED

advance. In the Tikhonov algorithm b and a have no obvious meaning. They must be suggested by looking at the change in the estimate behavior as b and a change, and perhaps using some apriori knowledge about the shape of q to choose values of b and a that give an estimate that is neither too flat, nor too oscillatory.

DESCRIPTORS: (U) *ALGORITHMS, *INVERSION, CONVERGENCE, INPUT, COMPARISON, STABILITY, ESTIMATES, PARAMETRIC ANALYSIS, COEFFICIENTS

AD-A174 728 .2 5/0.6 5/0

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Becton-Dickson Model 420 Fluorescence-Activated Cell Sorter (FACS).

DESCRIPTIVE NOTE: Final rept. 21 Dec 84-20 Dec 85,

MAY 86 9P

PERSONAL AUTHORS: Olsen,Richard G. ;

CONTRACT NO. AFOSR-85-0086

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR TR-86-0369

UNCLASSIFIED REPORT

ABSTRACT: (U) The Epics 741 Single Laser System Flow Cytometer has and is being used in DOD projects entitled Immune Dysfunctions and Abrogation of the Inflammatory Response by Environmental Chemicals. The flow cytometry instrument is being used to evaluate the in vitro effects of unsymmetrical dimethyl hydrazine on the distribution and expression of T-lymphocyte subset antigens and Ia antigens.

DESCRIPTORS: (U) *LYMPHOCYTES, *IMMUNOLOGY, *IN VITRO ANALYSIS, *ANTIGENS, *DIMETHYLHYDRAZINES, DYSFUNCTION, IMMUNITY, INFLAMMATION, RESPONSE(BIOLOGY), CHEMICALS, ENVIRONMENTS, VETERINARY MEDICINE

IDENTIFIERS: (U) Cytometers, Cytometry, T lymphocytes, LPN-OSURF-76453417 16897, PE61102F, WUAFOSR2917A4

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 715 .20 1/0.20 12/0

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MECHANICAL ENGINEERING AERONAUTICAL ENGINEERING AND MECHANICS

(U) Analytical Investigations of Bulk Wave Resonators in the Piezoelectric Thin Film on Gallium-Arsenide Configuration.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 85-31 Aug 86.

SEP 86 9P

PERSONAL AUTHORS: Tiersten,Harry F. ;

CONTRACT NO. AFOSR-84-0351

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR
TR-86-2035

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of earlier calculations of the quality factor of the piezoelectric thin film on semiconductor composite resonator due to radiation into the semiconductor wafer for the strip case both when trapping is and is not present are briefly discussed. Experimental verification of the results is noted. It is also noted that the direct calculation procedure is extremely cumbersome to use, but that it is required to check the accuracy of a perturbation procedure which is much easier to use. The perturbation procedure for the calculation of the quality factor of the composite resonator due to radiation into the semiconductor wafer is discussed and it is noted that the perturbation procedure enables calcualtions for the case of rectangular electrodes and diaphrams to be performed. It is further noted that for the strip case the calculations of the quality factor using the perturbation procedure are in good agreement with the results obtained from the earlier more cumbersome direct procedure. Keywords include: Piezoelectricity; Elasticity; Resonators; Bulk Waves; Thin Films; Semiconductor Wafers; Composite Resonators; Energy Trapping; Radiation; Quality Factor; Plate Vibrations.

AD-A174 715 CONTINUED

DESCRIPTORS: (U) *WAVE PROPAGATION, *PIEZOELECTRIC MATERIALS, *RESONATORS, *GALLIUM ARSENIDES, *SEMICONDUCTORS, *WAFERS, THIN FILMS, ACCURACY, COMPUTATIONS, NUMERICAL METHODS AND PROCEDURES, ENERGY, ELECTRODES, RECTANGULAR BODIES, ELASTIC PROPERTIES, CONFIGURATIONS, QUALITY

IDENTIFIERS: (U) WUAFOSR2306B2, PE61102F

DTIC REPORT BIBLIOGRAPHY

AD-A174 711 .20 9/0.20 14/0

COLORADO UNIV AT BOULDER DEPT OF ASTROPHYSICAL PLANETARY AND ATMOSPHERIC SCIENCES

(U) Plasma Wave Turbulence and Electromagnetic Radiation Caused by Electron Beams.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 85,

SEP 85 10P

PERSONAL AUTHORS: Goldman,Martin V. ;

CONTRACT NO. AFOSR-84-0007

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-86-2062

UNCLASSIFIED REPORT

ABSTRACT: (U) Research was completed on a program to understand the mechanisms by which mildly relativistic electron beams can generate microwave radiation when injected into plasmas. The chief phenomena found to be involved were (1) stimulation compton conversion of Langmuir waves excited by relativistic e beams and (2) multiple Raman up conversion of radiation from pre-existing Langmuir turbulence. Numerical programs were developed for computing the evolution of beam excited Langmuir waves into strongly turbulent states. It was further, experimentally determined that quiet plasmas with low level of ambient density fluctuations were necessary in order to obtain optimum radiation.

DESCRIPTORS: (U) *ELECTRON BEAMS, *PLASMAS(PHYSICS), *MICROWAVES, *ENERGY TRANSFER, CONVERSION, DENSITY, ELECTROMAGNETIC RADIATION, EXCITATION, NUMERICAL ANALYSIS, OPTIMIZATION, PLASMA WAVES, QUIET, RADIATION, RELATIVITY THEORY, STIMULATION(GENERAL), TURBULENCE, VARIATIONS, FREQUENCY CONVERSION, FREQUENCY MULTIPLIERS

IDENTIFIERS: (U) Langmuir waves, WUAFOSR2301A8, PE61102F

AD-A174 711

SEARCH CONTROL NO. EVJ56L

AD-A174 703 .7 4/0

VIRGINIA INST OF MARINE SCIENCE GLOUCESTER POINT

(U) A Thermodynamic Study of Solutions of Liquid Hydrocarbon Mixtures in Water.

DESCRIPTIVE NOTE: Journal article,

86 6P

PERSONAL AUTHORS: Burris,David R. ;MacIntyre,William G. ;

REPORT NO. VIMS-CONTRIB-1315

CONTRACT NO. AFOSR-83-0036

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-86-2027

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Geochimina et Cosmochimica Acta, v50 p1545-1549 1986.

ABSTRACT: (U) The hydrocarbon solution process in water was studied because it is important in environmental and geological situations. The aqueous solubility of binary hydrocarbon mixtures was determined (n-octane + 1-methylnaphthalene at 20 and 70 C; n-octane + ethylbenzene at 20 C and tetraline + methylcyclohexane at 20 C). Vapor-liquid equilibrium hydrocarbon phase activity coefficients for the above mixtures were also determined. Hydrocarbon activity coefficients in the aqueous phase were found not to be measurably reduced in the presence of hydrocarbon co-solutes. This indicates that the effects of aqueous phase solute-solute interactions can not be determined within the precision of water solubility measurements. The presence of a substantial amount of water in the liquid hydrodcarbon phase at 70C did not significantly affect the hydrocarbon activity coefficients in the hydrocarbon phase. Activity coefficients estimated by the UNIFAC group-contribution method indicate that water in the hydrocarbon phase may not significantly affect hydrocarbon phase activity coefficients up to 150 C.

AD-A174 703

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 703 CONTINUED

DESCRIPTORS: (U) *SOLUTIONS(MIXTURES), *THERMODYNAMIC PROPERTIES, *HYDROCARBONS, ACTIVATION, COEFFICIENTS, LIQUIDS, SOLUBILITY, MIXTURES, WATER, THERMOCHEMISTRY, MEASUREMENT, LIQUID PHASES, REPRINTS

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F

AD-A174 702

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Optimal Control of Systems Possessing Symmetries,

NOV 84 5P

PERSONAL AUTHORS: Grizzle,Jessy W. ;Marcus,Steven I. ;

CONTRACT NO. F49620-82-C-0033, AFOSR-84-0089

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2024

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, vAC-29 n11 p1037-1040 Nov 84.

ABSTRACT: (U) It is shown that a symmetry in an optimization problem induces a decomposition of the optimal feedback control law into factors. One factor can be calculated algebraically and depends only on the symmetry; the other factor corresponds to a lower dimensional optimization problem. This gives a priori information about the structure of the optimal feedback control law and indicates a possible more efficient method for optimizing such systems. Keywords; Nonlinear systems; Reprints.

DESCRIPTORS: (U) *CONTROL THEORY, *CONTROL SYSTEMS, CONTROL, DECOMPOSITION, FEEDBACK, NONLINEAR SYSTEMS, OPTIMIZATION, REPRINTS, SIZES(DIMENSIONS), SYMMETRY, REPRINTS

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 683 .21 2/0.21 5/0

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Dense-Spray Structure and Phenomena.

DESCRIPTIVE NOTE: Annual rept. 15 Jul 85-14 Jul 86,

AUG 86 72P

PERSONAL AUTHORS: Parthasarathy,R. N. ;Sagar,A. ;Faeth,G. M. ;

CONTRACT NO. AFOSR-85-0244

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-1071

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes theoretical and experimental study of dense sprays. The work was divided into two phases: (1) an investigation of particle laden water jets; and (2) an investigation of large scale liquid jet in the atomization regime. The particle laden jet experiments involved nearly monodisperse glass particles in water injected into still water, to simulate phase density ratios typical of high pressure sprays. Preliminary findings suggest that the locally homogeneous flow approximation, where interphase transport rates are assumed to be infinitely fast, is more successful for this flow than was observed during earlier work with phase density ratios further from unity. This is encouraging for application of relatively simple locally homogeneous flow analysis to high-pressure combustion processes encountered in power and propulsion systems. Measurements of the atomization of the atomization of large scale liquid jets show the presence of an all liquid core which extends an appreciable distance from the injector (ca. 200 injector diameters) at atmospheric pressure conditions. The drop containing shear layer adjacent to this core exhibits some properties of a locally homogeneous flow, however, large drops were also formed at the liquid surface which probably depart from this behavior. Measurements of liquid volume fraction suggest relatively slow rates of turbulent mixing for the

AD-A174 683

AD-A174 683 CONTINUED

low pressure conditions of present experiments.

DESCRIPTORS: (U) *WATER JETS, *ATOMIZATION, *SPRAYS, *COMBUSTION, BAROMETRIC PRESSURE, DROPS, GLASS, HIGH DENSITY, HIGH PRESSURE, HOMOGENEITY, LAYERS, LIQUID JETS, LOW PRESSURE, MIXING, PARTICLES, PHASE STUDIES, PROPULSION SYSTEMS, RATES, RATIOS, SHEAR PROPERTIES, SURFACES, TURBULENT FLOW, TWO PHASE FLOW, TRANSPORT PROPERTIES

IDENTIFIERS: (U) Turbulent mixing, WUAFOSR2308A2, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 668 .20 11/0.22 2/0

LOCKHEED MISSILES AND SPACE CO INC PALO ALTO CA PALO ALTO RESEARCH LAB

(U) Local-Global Interactions in the Transient Response of Lattice-Truss Plates.

DESCRIPTIVE NOTE: Annual rept.,

AUG 84 42P

PERSONAL AUTHORS: Regelbrugge,M. E. ;Park,K. C. ;

REPORT NO. LMSC-D878939

CONTRACT NO. F49620-83-C-0018

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-86-0452

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Revision of report dated Feb 84. Presented at the Structures, Materials and Dynamics Conference (24th), 14-16 May 84.

ABSTRACT: (U) The transient response of lattice truss plates is studied with emphasis on how the individual lattice members dynamic characteristics influence with transient response characteristics. When the lattic members are modeled as bars, the transient responses are dominated by the low frequency components that correspond to the continuum thick plate case. However, when the lattic members are modeled as slender beams to be more realistic, the dynamic characteristics of the individual lattice members significantly influence the global transient response. The level of influence increases as the member slenderness ratio increases. The results underscore the importance of local high wave member modes that must be treated satisfactorily both in passive and active control of large lattice truss space structures.

DESCRIPTORS: (U) *MILITARY SATELLITES, *STRUCTURAL RESPONSE, CONTROL, DYNAMICS, PARTS, PASSIVE SYSTEMS, TRANSIENTS, TRUSSES, PLATES

AD-A174 668

AD-A174 668 CONTINUED

IDENTIFIERS: (U) Lattice structures, PE61102F, WUAFOSR2302B1

AD-A174 668

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 667 .6 1/0.6 4/0

CALIFORNIA UNIV SAN FRANCISCO

(U) Cloning of the poly(ADP-ribose) Gene from Rat Liver.

DESCRIPTIVE NOTE: Progress rept. 1 Sep 85-31 Aug 86,

SEP 86 39P

PERSONAL AUTHORS: Kun,Ernest ;

CONTRACT NO. AFOSR-85-0377

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-88-0439

UNCLASSIFIED REPORT

ABSTRACT: (U) Inhibition of the nuclear enzyme poly (ADP-ribose) polymerase by substances that interfere with the DNA binding of the enzyme molecule profoundly inhibit cellular phenotypic changes (malignant transformation) induced either by non-toxic doses of ultimate carcinogens and more recently in an oncogene construct-containing cell line by steroid hormones. Enzyme inhibition in ontogenically stable cells had no measurable physiological effect as tested by cell growth or viability, thus the biological role of poly (ADP-ribose) polymerase seems to be confined to cells undergoing differentiation, development or oncogenesis that occurs without detectable cellular toxicity (no DNA damage).

DESCRIPTORS: (U) *GENES, *LIVER, *CLONES, *ENZYMES, STEROIDS, BIOLOGY, CELLS(BIOLOGY), GENETIC ENGINEERING, DAMAGE, DEOXYRIBONUCLEIC ACIDS, MOLECULES, INHIBITION, DOSAGE, TOXICITY, CARCINOGENS, CELLS, CONFINEMENT(GENERAL), HORMONES, CANCER, TRANSFORMATIONS, RATS, STABILITY

IDENTIFIERS: (U) ADP(Adenosine Diphosphate), ADP ribose polymers, Polymerases, PE61102F, WUAFOSR2312A5

AD-A174 667

AD-A174 662 .12 1/0.20 4/0

CALSPAN UB RESEARCH CENTER BUFFALO NY*

(U) Viscous Interactions at Hypersonic Speed.

DESCRIPTIVE NOTE: Final rept. 17 Mar 84-Oct 86,

SEP 86 54P

PERSONAL AUTHORS: Holden,Michael S. ;Lee,Jhin Ho ;

REPORT NO. CUBRC-86611

CONTRACT NO. F49620-84-K-0009

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-86-2072

UNCLASSIFIED REPORT

ABSTRACT: (U) This work has been directed toward investigations of fundamental aerothermal phenomena in hypersonic flow, with particular emphasis on viscous/inviscid interaction phenomena. The experimental studies were conducted to examine the changes in the structure at the base of a hypersonic turbulent boundary layer as it is subjected to a strong self induced pressure gradient in regions of shock wave/boundary layer interaction. The initial phase of the theoretical program was directed toward summarizing existing techniques for obtaining Navier/Stokes solutions for laminar flow over flat plates in hypersonic flow. In the experimental program, surface and flow field measurements were made to examine the detailed flow mechanics associated with turbulent boundary layer separation over a large cone flare model at Mach 11, 13, and 16 for Reynold numbers up to 100 million. Solutions have been obtained to Navier-Stokes equations for the laminar flow over the leading edge of a sharp flat plate in Mach 16 flow for highly cooled wall conditions using a modified MacCormack/Shang fully explicit formulation. To obtain a stable converged solution it was necessary to reduce the grid size close to the leading edge to the order of the mean free path, and typically 20,000 time steps were required to achieve convergence. However, once obtained, the solution was a

AD-A174 662

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 662 CONTINUED

good agreement with experiment.

DESCRIPTORS: (U) *AEROTHERMODYNAMICS, *HYPERSONIC FLOW, *TURBULENT BOUNDARY LAYER, *VISCOUS FLOW, BOUNDARY LAYER FLOW, BOUNDARY LAYER, COOLING, FLAT PLATE MODELS, FLOW, FLOW SEPARATION, GRIDS, HYPERSONIC VELOCITY, FLOW FIELDS, INTERACTIONS, INVISCID FLOW, LAMINAR FLOW, LEADING EDGES, MEAN FREE PATH, MEASUREMENT, MECHANICS, NAVIER STOKES EQUATIONS, PRESSURE GRADIENTS, SHARPNESS, SIZES(DIMENSIONS), STRUCTURAL PROPERTIES, VISCOSITY, WALLS, SHOCK WAVES, REYNOLDS NUMBER, HEAT TRANSFER

IDENTIFIERS: (U) WUAFOSR2307A1, PE61102F

AD-A174 661 .11 5/0.20 11/0

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS CENTER

(U) Damage Models for Delamination and Transverse Fracture in Fibrous Composites.

DESCRIPTIVE NOTE: Annual technical rept. 15 Feb 85-14 Feb 86.

MAR 86 62P

PERSONAL AUTHORS: Schapery,R. A. ;Lamborn,M. J. ;Tonda,R. D. ;

REPORT NO. MM-5034-86-8

CONTRACT NO. AFOSR-84-0068

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR TR-86-1078

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical and experimental work on the deformation and fracture of fibrous composites with distributed damage is described. Emphasis is on establishing the existence of potentials analogous to strain energy and on using these so-called work potentials in fracture studies. The difference between changing damage and constant damage processes is accounted for by using multivalued work potentials. It was shown previously that these potentials lead to a path independent J integral for characterizing fracture. A recent study is described in which the J integral is used to determine fracture energy for delamination in double-cantilevered beam specimens with a large percentage of off-axis fibers; the results are compared with fracture energies found by standard methods (which to not account for effects of distributed damage). Discussed next are investigations of flat rectangular bar specimens and thin-walled tubes under axial and torsional loading. The limited amount of experimental data presently available on angle-ply laminates confirms the existence of a potential even when there are large increases in

AD-A174 661

AD-A174 661 CONTINUED

microcracking. The Appendix contains copies of technical reports prepared during the project year and the abstract of a recently completed Ph.D. dissertation.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *FIBERS, FIBER REINFORCED COMPOSITES, REINFORCED PLASTICS, J INTEGRALS, LAMINATES, DEFORMATION, TORQUE, TORSION, CONSTANTS, DAMAGE, DISTRIBUTION, ENERGY, FRACTURE(MECHANICS), MICROCRACKING, MODELS, STANDARDIZATION, STRAIN(MECHANICS), TRANSVERSE

IDENTIFIERS: (U) Delamination, WUAFOSR2302B2, PE61102F

AD-A174 659 .12 3/0

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Robust Optimium Invariant Tests of Covariance Structures Useful in Linear Models.

DESCRIPTIVE NOTE: Technical rept.,

AUG 86 38P

PERSONAL AUTHORS: Das,Rita ;Sinha,Bimal K. ;

REPORT NO. TR-86-20

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2054

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper investigates robust optimum invariant tests of some covariance structurs that naturally arise in the context of robustness study in linear models. To describe this concept, let (Y, X beta, sigma sq I) be the assumed (probably incorrect) model while (Y, X beta, sigma sqV) be the correct model, resulting in the specification error in the dispersion matrix. Then it is well known that the BLUEs of all estimable linear parametric function A beta remain the same under both the models if and only if the following condition holds on the structure of V: LX'VZ = 07) where z denotes a matrix of maximal rank satisfying the condition Z'X = 0. Our object is to test the null hypothese that V possesses the structure based on samples on Y under the model (Y, X beta, sigma sq V) for a fixed design matrix X. This hypothesis is of considerable interest as its acceptance greatly simplifies determination of BLUEs of estimable linear parametric functions.

DESCRIPTORS: (U) *STATISTICAL TESTS, *COVARIANCE, STRUCTURES, LINEARITY, MATHEMATICAL MODELS, HYPOTHESES, MANUFACTURING, MATRICES(MATHEMATICS), OPTIMIZATION, PARAMETRIC ANALYSIS

AD-A174 661

AD-A174 659

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 659 CONTINUED

IDENTIFIERS: (U) Robustness, PE61102F, WUAFOSR2304A5

AD-A174 657 .12 5/0.13 8/0

STANFORD UNIV CA

(U) Center for Automation and Manufacturing Science Established at Stanford University.

DESCRIPTIVE NOTE: Final rept. Sep 84-Sep 85,

DEC 85 225P

PERSONAL AUTHORS: Cannon,Robert H. ;Binford,Thomas O. ; Meindl,James D. ;

REPORT NO. SPO-13649-01-0092

CONTRACT NO. F49620-82-C-0092

PROJECT NO. 2306

TASK NO. A3

MONITOR: AFOSR TR-86-1074

UNCLASSIFIED REPORT

ABSTRACT: (U) A system of real time collision avoidance was implemented. The system is based on the use of potential functions around obstacles. An experimental manipulator programming system COSMOS using the method has been designed for the PUMA and demonstrated with obstacles detected by an MIC vision module. A dynamic simulator was implemented as a software equivalent of a robot are. A new nonlinear and generalizable technique has been developed that will continuelly monitor the parameters of a robot arm to estimate continuously the inertial forces and friction in robot joints. Contributions have been made toward the successor for ACRONYM the modeling system of successor is greatly generalized to include multiple naming, holes and set operations on volumes. Automatic Task Level Assembly Synthesizer (ATLAS) was advanced significantly in power and usability. Several porable versions of LISP have been developed & both utilized. Implementation of new edge operator, tests of shape from a shading algorithm, and experimentation toward building an active ranging device.

DESCRIPTORS: (U) *MANIPULATORS, *COMPUTER AIDED MANUFACTURING, COMPUTERIZED SIMULATION, AUTOMATION,

AD-A174 659

AD-A174 657

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 657 CONTINUED

FLEXIBLE STRUCTURES, DYNAMICS, SIMULATORS, FORCE(MECHANICS), ROBOTS, OPERATION, COMPUTER PROGRAMS, FRICTION, OPERATORS(PERSONNEL), COLLISION AVOIDANCE, REAL TIME, JOINTS, VISION

IDENTIFIERS: (U) LISP programming language

IAC NO. MT-003635

IAC DOCUMENT TYPE: MTIAC - MICROFICHE --

IAC SUBJECT TERMS: T--(U)Robots, Automation, Collision Avoidance, Vision(Machine), Manipulators, Tactile Sensors, /Code D, /Code T, /Code X.;

AD-A174 652 .13 12/0.21 2/0

PURDUE UNIV LAFAYETTE IND THERMAL SCIENCES AND PROPULSION CENTER

(U) Fuel Spray Ignition by Hot Surfaces and Stabilization of Aircraft Fires.

DESCRIPTIVE NOTE: Annual technical rept. 15 Nov 81-14 Nov 83 on Task 3,

NOV 85 56P

PERSONAL AUTHORS: Lefebvres,A. H. ;Murthy,S. N. ; Skivffstad,J. G. ;

REPORT NO. LMS/AFOSR-COMB/83-3

CONTRACT NO. AFOSR-82-0107

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-86-0874

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) In Task I, the research primarily involved refinement of the experimental apparatus, instrumentation, measurement techniques, and acquisition of experimental data. Special efforts were made to assure the reliability of the measurements, including runs made to examine the process of oxide formation when using pure nickel surfaces. Experimental data were acquired for both liquid kerosine (Jet-A) and gaseous commercial propane fuels over a broad range of run conditions. Evaluation of the results in the context of existing theories and modifications of the CONCHAS-SPRAY code to model this experimental system were also undertaken. In Task II, the extensive experimental results on blowoff velocity, obtained using both conventional Vee-gutter and single-sided flameholders, provided the data base for an analytical study of the factors governing the stability characteristics of bluff-body flameholders. An equation was derived for predicting blowoff velocity in terms of flameholder size, flameholder blockage, ambient air

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 648 CONTINUED

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A174 646 .13 8/0

NORTH CAROLINA UNIV AT CHARLOTTE DEPT OF MATHEMATICS

(U) Markovian Shock Models, Deterioration Processes, Stratified Markov Processes Replacement Policies.

DESCRIPTIVE NOTE: Final rept. 1 Jul 80-31 Dec 85,

DEC 85 25P

PERSONAL AUTHORS: Abdel-Hameed,M. ;

CONTRACT NO. AFOSR-80-0245

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0371

UNCLASSIFIED REPORT

ABSTRACT: (U) Research topics included shock and wear processes, optimal maintenance and replacement policies, positive dependence of components, life distribution properties of devices, analysis of censored failure time data, and accelerated life testing of systems.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *APPLIED MATHEMATICS, *LIFE EXPECTANCY(SERVICE LIFE), ACCELERATED TESTING, LIFE TESTS, FAILURE, TIME, MARKOV PROCESSES, SHOCK, PARTS, WEAR, DETERIORATION, MAINTENANCE, OPTIMIZATION, POLICIES, REPLACEMENT

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 652 CONTINUED

pressure and temperature, and temperature, and laminar flame speed. Predictions of blowoff velocity based on this equation showed excellent agreement with experimental values. In Task III, experimental studies were completed and results correlated for ventilation flow from surroundings into a cavity with a small internal flow. Extensive flow visualization studies were also undertaken for flow past a protrusion, including the case of a jet through the protrusion. These studies provided data on formation of vortices adjoining and over the protruberance and the nature of jet flow entrainment into them.

DESCRIPTORS: (U) *FLAME HOLDERS, *IGNITION, *AIRCRAFT FIRES, ACQUISITION, BLOWOFF, VELOCITY, EQUATIONS, FLOW VISUALIZATION, COMMERCIAL EQUIPMENT, FUELS, GASES, PROPANE, AIR PRESSURE, DATA BASES, HIGH TEMPERATURE, SURFACES, BLOCKING, FUEL SPRAYS, JET FLOW, KEROSENE, LIQUIDS, OXIDATION, NICKEL, INTERNAL, STABILIZATION, VENTILATION, LAMINAR FLOW, MEASUREMENT, METHODOLOGY, BLOWOFF, PREDICTIONS, VELOCITY, RELIABILITY, SIZES(DIMENSIONS), VORTICES

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2

AD-A174 648 .12 3/0

FORD AEROSPACE AND COMMUNICATIONS CORP PALO ALTO CA

(U) On First Passage Times and Differential Equations,

86 25P

PERSONAL AUTHORS: Wenocur,Michael L. ;

CONTRACT NO. F49620-86-C-0022

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-0478

UNCLASSIFIED REPORT

ABSTRACT: (U) Practical and theoretical considerations in computing first passage time statistics are considered. We are motivated by first passage times as models of failure times. In Section 1, the relevance of first passage time distrbutions as failure time models is indicated. Also, the spectral series expansion solution to the backward equation is introduced. In Section 2, algorithms for approximating w(x,t) are obtained. In particular, the infinite spectral expansion of rw(x,t) is approximated by an n-term sub-expansion which matches the first n-1 moments. Proofs validating the spectral expansion and the related approximation scheme are given in the Appendix. In Sections 3 and 4, methods are given for obtaining the eigenvalues and first passage moments, necessary for computing approximations to w(x,t). In Section 5, computational issues related to calculating the moment generating function are considered. Sections 6 and 7 include theoretical complements about first passage times. In particular, the moment generating function is shown to possess an interesting representation having exponential form (cf equations (7.1)). This exponential representation is related to asymptotic expansions used in analyzing perturbations of certain second-order differential equations.

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, *DIFFERENTIAL EQUATIONS, ALGORITHMS, EIGENVALUES, TIME, PERTURBATIONS, EXPANSION, SERIES(MATHEMATICS), EXPANSION, SPECTRA, MOMENTS, STATISTICS, MATHEMATICAL MODELS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 629 .12 3/0

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) Further Studies in Estimation of Life Distribution Characteristics from Censored Data.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 85-31 May 86.

JUN 86 15P

PERSONAL AUTHORS: Padgett,K. J. ;

CONTRACT NO. AFOSR-84-0156

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2050

UNCLASSIFIED REPORT

ABSTRACT: (U) The main objectives of this research have been the development of smooth nonparametric estimators of quantile functions from right-censored data and the further study of smooth density estimators from censored observations. In particular, kernel-type quantile estimators have been obtained under censoring which give better estimates of percentiles of the lifetime distribution than the usual product-limit quantile estimator. During the past year, asymptotic properties of these kernel quantile estimators have been developed, including asymptotic normality, consistency, and mean square convergence. In addition, a data-based procedure for selecting the bandwidth has been investigated using the bootstrap, and approximate confidence for the true quantile have been proposed using bootstrap estimates of the sampling distribution. Theoretical results on the optimal bandwidth selection for kernel density estimators under random right censorship have also been obtained. New results in several other problem areas were also developed. These included the study of linear empirical Bayes estimators, prediction intervals for the inverse Gaussian distribution, nonparametric hazard rate estimation under censoring, nonparametric inference for step-stress accelerated life tests under censoring, discrete failure models, simultaneous confidence

AD-A174 629

AD-A174 629 CONTINUED

intervals for pairwise differences of normal means, and optimal designs for comparing treatments with a control.

DESCRIPTORS: (U) *ESTIMATES, *NONPARAMETRIC STATISTICS, MATHEMATICAL PREDICTION, ACCELERATED TESTING, ASYMPTOTIC NORMALITY, BANDWIDTH, CENSORSHIP, CONFIDENCE LEVEL, CONFIDENCE LIMITS, CONVERGENCE, DISTRIBUTION, FAILURE, HAZARDS, INTERVALS, INVERSION, LIFE TESTS, MEAN, NORMAL DISTRIBUTION, OPTIMIZATION, RATES, SAMPLING, SELECTION

IDENTIFIERS: (U) *Quantile functions, *Quantiles, PE61102F, WUAFOSR2304A5

AD-A174 629

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 623

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Approximate and Local Linearizability of Nonlinear Discrete-Time Systems.

86 31P

PERSONAL AUTHORS: Lee,Hong-Gi ;Marcus,Steven I. ;

CONTRACT NO. F49602-82-C-0033, AFOSR-84-0089

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-86-0551

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-ECS84-12100.

ABSTRACT: (U) This document considers a single-input nonlinear discrete-time system of a certain form. Many authors have studied (local or global) linearization (Cheng et. al. 1985, Hunt and Su 1981, Jakubczyk and Respondek 1980, Krener 1973, Su 1982) and approximate linearization (Krener 1984) by state feedback and coordinate change for nonlinear continuous-time systems. This paper discusses necessary conditions and sufficient conditions for local linearization and approximate linearization by state feedback and coordinate change for nonlinear discrete-time systems. Other related work on nonlinear discrete-time systems can be found in (Grizzle 1985a, 1985b, Grizzle and Nijmeijer 1985, Monaco and Normand-Cyrot 1983a, 1983b). Keywords: Matrices(Mathematris).

DESCRIPTORS: (U) *LINEARITY, *NONLINEAR SYSTEMS, MONACO, COORDINATES, DISCRETE DISTRIBUTION, TIME, INPUT, THEOREMS, MATRICES(MATHEMATICS), FEEDBACK

IDENTIFIERS: (U) *Discrete time systems, WUAFOSR2304A1, PE61102F

AD-A174 621 .14 3/0.20 12/0

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Design and Fabrication of Submicron Magnetic Bubble Device Technology.

DESCRIPTIVE NOTE: Annual scientific rept. no. 2,

OCT 86 135P

PERSONAL AUTHORS: Kryder,M. H. ;Alex,M. ;Bauer,C. L. ; Campbell,R. O. ;Greve,D. W. ;

CONTRACT NO. AFOSR-84-0341

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR TR-86-1075

UNCLASSIFIED REPORT

ABSTRACT: (U) Work was carried out on high density (16 to 64 Mbit/sq cm) magnetic bubble device technology. Highlights of the research include the successful fabrication of silicon MOSFETS on bubble garnet substrates and the development of ion implanted bubble devices utilizing 0.5um bubbles in garnets with isotropic magnetostriction. In addition, studies of the effects of ion implantation on garnet lead to improved fabrication techniques for the 0.5um devices. Chips utilizing 1um bubbles were demonstrated to have about 9% bias field margins at 50 Oe drive, and a numerical model was developed to model current accessed ion implanted devices. Keywords Include: Bubble Memory, Ion Implantation, Garnet, Silicon-on-Insulator, and Silicon-on-Garnet.

DESCRIPTORS: (U) *BUBBLE MEMORIES, *MOSFET SEMICONDUCTORS, *SILICON, *ION IMPLANTATION, BUBBLES, GARNET, SUBSTRATES, FABRICATION, METHODOLOGY, HIGH DENSITY, MATHEMATICAL MODELS

IDENTIFIERS: (U) WUAFOSR2305C1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 620 .9 1/0.14 2/0.17 6/0

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 85-31 Aug 86,

OCT 86 25P

PERSONAL AUTHORS: Auld,B. A. ;Gimple,M. ;

CONTRACT NO. F49620-84-C-0095

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-86-1073

UNCLASSIFIED REPORT

ABSTRACT: (U) Capacitive sensor arrays have been developed for multifunction sensing in robotic applications. The arrays consist of one-dimensional arrays of strip electrodes. They can be addressed to provide the different functions enumerated in 18. Distance ranging, edge detection, response optimization, and matched filtering have all been demonstrated experimentally with metal samples. Edge detection has been observed with dielectric samples, which cannot be sensed with inductive probes. Keywords include: Sensors, Robotics, Capacitive, Arrays, Distance Ranging, Edge detection, Response Optimization, Field Adaptation, Pattern Matching, Matched Flitering, Analytic Modeling.

DESCRIPTORS: (U) *DETECTION, *ARRAYS, *NONDESTRUCTIVE TESTING, *MATCHING, *DETECTORS, *ELECTRODES, MATHEMATICAL MODELS, EDGES, ADAPTATION, METALS, SAMPLING, ONE DIMENSIONAL, OPTIMIZATION, RESPONSE, ROBOTICS, DIELECTRICS, MATCHED FILTERS, ROBOTS

IDENTIFIERS: (U) WUAFOSR2306A2, PE61102F

IAC NO. NT-035686

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

AD-A174 620 CONTINUED

IAC SUBJECT TERMS: N--(U)SENSORS, ELECTROMAGNETIC TESTING, ROBOTICS, CONTROL, ARRAYS, FILTERS, RESPONSE, TEST EQUIPMENT, RESEARCH, ANTENNAS, SIGNAL PROCESSING, PROBES, METALS, DIELETRICS, MATERIALS, PROPERTIES, RESOLUTION, SIZES(DIMENSIONS);

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 608 .20 1/0.21 2/0.21 5/0

CALIFORNIA INST OF TECH PASADENA

(U) Mechanisms of Exciting Pressure Oscillations in Ramjet Engines.

DESCRIPTIVE NOTE: Annual rept. Sep 85-Sep 86,

86 23P

PERSONAL AUTHORS: Marble,Frank E. ;

CONTRACT NO. AFOSR-84-0286

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-0988

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past two years, we have been able to understand, in principle, the mechanism of one predominant mode of combustion instability in dump combustors for ramjet engines. The objectives of further experiments have been to provide a quantitive, physical basis for elements of this mechanism which will allow application of the results to a wide class of combustor sizes, fuels and mixture ratios, and to more complex acoustic environments. One mode of unsteady combustion in dump burners, which under certain circumstances may lead to combustion instability, involves the periodic formation of a large vortex in the separated shear layer and its subsequent movement toward the combustor wall. When oscillations appear, the frequency of the vortex shedding coincides with that of some natural acoustic mode of the apparatus. Detailed experiments show that the heat release which drives the oscillation occurs predominantly as the result of an interaction between this vortex and the wall. Recent experiments and calculations have shown that the time delay between vortex formation and the wall encounter is strongly dependent on the pressure amplitude of the oscillation and, consequently, and acoustic mode of particular frequency will be excited to an amplitude required to produce the suitable phase of the heat release. Experiments have been performed to assess the role of

AD-A174 608

AD-A174 608 CONTINUED

chemical time in the overall time delay. The results provide means for using the results for different mixture ratios and fuel types. Keywords: Combustion, Instability, Pressure oscillations.

DESCRIPTORS: (U) *COMBUSTORS, *COMBUSTION STABILITY, *RAMJET ENGINES, OSCILLATION, AMPLITUDE, PRESSURE, LAYERS, SEPARATION, SHEAR PROPERTIES, VORTICES, CHEMICALS, TIME, DELAY, TIME INTERVALS, VORTEX SHEDDING, ACOUSTICS, COMBUSTORS, SIZES(DIMENSIONS), ENVIRONMENTS, FUELS, RATIOS, WALLS, RELEASE

IDENTIFIERS: (U) Unsteady combustion, Dump combustors, WUAFOSR2308A2, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 604

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) A Single Server Queue in a Hard-Real-Time Environment,

DEC 85 9P

PERSONAL AUTHORS: Baccelli,Francois ;Trivedi,Kishor S. ;

CONTRACT NO. AFOSR-84-0132, NSF-MCS-83-0200

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-86-0744

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Operations Research Letters, v4 n4 p161-168 Dec 85.

ABSTRACT: (U) Consider a single server first in first out queue in which each arriving task has to be completed within a certain period of time (its deadline). more precisely, each arriving task has its own deadline - a non-negative real number - and as soon as the response time of one task exceeds its deadline, the whole system in considered to have failed. (In that sense the deadline is hard.) The main practical motivation for analyzing such queues comes from the need to evaluate mathematically the reliability of computer systems working with real time constraints (space or aircraft systems for instance). The main concernes with the analytical characterization of the transient behavior of such a queue in order to determine the probability of meeting all hard deadlines during a finite period of time (the mission time). The probabilistic methods for analyzing such systems are suggested by earlier work on impatience in telecommunication systems. Keywords: queues with breakdown; real time systems; transient analysis; reprints.

DESCRIPTORS: (U) *QUEUEING THEORY, *REAL TIME, AIRCRAFT, MISSIONS, TIME, REPRINTS, TELECOMMUNICATIONS, RESPONSE, TRANSIENTS, METHODOLOGY, PROBABILITY, REACTION TIME, SYSTEMS ANALYSIS, RELIABILITY(ELECTRONICS)

IDENTIFIERS: (U) PE61102F, WUAFOSR2304K3

AD-A174 604

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 602 .20 11/0.22 2/0

WEA CAMBRIDGE MA

(U) Dynamic Analyses of Two-Dimensional Lattices.

DESCRIPTIVE NOTE: Technical rept. 1 Apr 83-1 Aug 84,

AUG 84 138P

PERSONAL AUTHORS: Williams,James H. , Jr.;Schroeder, Robert A. ;Lee,Samson S. ;

CONTRACT NO. F49620-83-C-0092

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR TR-86-2070

UNCLASSIFIED REPORT

ABSTRACT: (U) The dynamic properties of two two dimensional lattice structures for large space structures were investigated both analytically, using the COSMIC NASTRAN finite element code, and experimentally, using an HP5451C Fourier analyzer, its accompanying modal analysis software, and a procedure called experimental modal analysis. One of the lattices was composed of five identical repeating substructures (5 bay beam). The other lattice was composed of twenty two identical repeating substructures (22 bay beam). For a frequency range extending from 0 Hz to 20 kHz, the NASTRAN analyses identified approximately 180 natural frequencies and mode shapes for each of the structures. The experimental modal analyses (limited by the frequency content of the impact excitation force) identified 34 mode shapes and natural frequencies of the 5-bay beam, and 18 mode shapes and 30 natural frequencies of the 22-bay beam. The COSMIC NASTRAN-predicted natural frequencies and the natural frequencies measured using experimental modal analyses agreed to within seven percent. The NASTRAN frequencies were consistently lower than those measured using the Fourier analyzer, probably because of inaccuracies in the finite element modeling of the intersections of the substructures. The Fourier analyzer also generated modal parameters (natural frequencies, damping ratios, and complex residues) for the two structures. In general,

AD-A174 602

AD-A174 602 CONTINUED

these parameters can be used to predict the impulse response, h(t), of a structure.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *MILITARY SATELLITES, *STRUCTURAL ANALYSIS, ANALYZERS, CODING, COMPUTER PROGRAMS, DAMPING, DYNAMICS, EXCITATION, FOURIER ANALYSIS, FREQUENCY, IMPACT, MATHEMATICAL MODELS, PARAMETERS, RANGE(EXTREMES), RATIOS, RESIDUES, RESONANT FREQUENCY, RESPONSE, SPACECRAFT, STRUCTURES, DYNAMIC LOADS, IMPULSE LOADING, VIBRATION

IDENTIFIERS: (U) NASTRAN computer program, COSMIC NASTRAN computer program, Lattice structures, PE61102F, WUAFOSR2307B1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 601 .3 1/0.20 5/0

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Isomers and Excitation Energies of C sub 4,

MAR 86 8P

PERSONAL AUTHORS: Magers,David H. ;Harrison,Robert J. ;
Bartlett,Rodney J. ;

CONTRACT NO. AFOSR-85-0011

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-0390

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v84 n8 p3284-3290, 15 Mar 86.

ABSTRACT: (U) Coupled-cluster (CC) and many-body perturbation theory (MBPT) studies of the rhombic and linear structures of C4 are reported. For each isomer, the electronic spectra is obtained, and comparisons are made with experimental matrix-isolated ESR and electronic spectra. The closed-shell superscript 1 A sub q rhombic ground state is found to be more stable than the superscript 3 sigma sub g(-) state of the linear isomer by 5 kcal/mol at the highest level of calculation performed (CCSDT-1). However, the predicted spectrum for linear C4 is in reasonable agreement with the observed results. An allowed electronic transition for the rhombus is predicted to lie in the same region, suggesting the possibility that both isomers could coexist in the experiment. Finally, vibrational frequencies for the rhombic isomer are calculated using analytical second-order MBPT second derivatives to aid in the experimental identification of this transient species.

DESCRIPTORS: (U) *MOLECULAR ISOMERISM, *EMISSION SPECTRA, *STELLAR ATMOSPHERES, *CARBON, ENERGY, EXCITATION, N BODY PROBLEM, PERTURBATION THEORY, FREQUENCY, VIBRATION, ELECTRON TRANSITIONS, COMPUTATIONS, RHOMBUS, STRUCTURES, TRANSIENTS, ELECTRON SPIN RESONANCE, REPRINTS, MOLECULAR VIBRATION

AD-A174 601

AD-A174 601 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 600 .12 5/0.12 7/0

STATE UNIV OF NEW YORK AT STONY BROOK

(U) The Design and Implementation of a Network Computer.

DESCRIPTIVE NOTE: Final summary rept. 15 Jun 81-14 Dec 85,

MAY 86 9P

PERSONAL AUTHORS: Bernstein,Arthur J. ;

CONTRACT NO. AFOSR-81-0197

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-86-0783

UNCLASSIFIED REPORT

ABSTRACT: (U) The research performed under this grant is concerned with distributed languages and algorithms. The results obtained can be divided into 5 major areas: Distributed Languages - High level Consideration; distributed algorithms; network communication; support of multicast; and computer program verification.

DESCRIPTORS: (U) *HIGH LEVEL LANGUAGE, *DISTRIBUTED DATA PROCESSING, ALGORITHMS, COMPUTER PROGRAM VERIFICATION, NETWORKS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2

AD-A174 600

AD-A174 598 .11 6/0

NORTHWESTERN UNIV EVANSTON IL TECHNOLOGICAL INST

(U) Investigation and Synthesis of High Temperature and Increased Stiffness RSP Aluminum Alloys.

DESCRIPTIVE NOTE: Annual Technical rept. 1 Oct 85-30 Sep 86,

OCT 86 12P

PERSONAL AUTHORS: Fine,Morris E. ;Weertman,Julia R. ;

CONTRACT NO. AFOSR-85-0337

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-86-1095

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research is to investigate two promising systems as the basis for high temperature aluminum alloys useful to 425 C (800 F). The first is a metal matrix composite consisting of an aluminum-magnesium alloy matrix reinforced by spinel (magnesium aluminate) particulate. The second system is tri-aluminum (zirconium, vanagium) dispersed in aluminum matrix. Here the lattice parameter matches that of the matrix. Research on dilute alloys has shown a low coarsening rate for this intermetallic at 425 C. Study of more concentrated alloys with the necessary volume percent of dispersid for high temperature creep and fatigue resistance is underway. A procedure for preparing specimens of the aluminum alloy matrix-spinel composite has been worked out and specimens are being prepared. In the procedure rapidly solidified alloy powder and oxide are mechanically alloyed, cold pressed, hot pressed, pressure forged and annealed. Extrusions containing 5 volume percent tri-aluminum (0.75 vanadium, 0.25 zirconium) were prepared for this research by Lockhead-Palo Alto from rapidly solidified foil. The measured creep rate at 425 C is much lower than in the current aluminum-iron-cerium alloy.

DESCRIPTORS: (U) *STIFFNESS, *ALUMINUM ALLOYS, *HIGH

AD-A174 598

AD-A174 598 CONTINUED

TEMPERATURE, MAGNESIUM ALLOYS, ZIRCONIUM ALLOYS, VANADIUM ALLOYS, ALUMINATES, CERIUM, CONCENTRATION(COMPOSITION), CREEP, DILUTION, EXTRUSION, FATIGUE(MECHANICS), HEAT RESISTANT ALLOYS, IRON ALLOYS, MAGNESIUM COMPOUNDS, MATRIX MATERIALS, METAL MATRIX COMPOSITES, POWDER ALLOYS, RATES, RESISTANCE, SOLIDIFICATION, SPINEL, SYNTHESIS

AD-A174 585 .20 11/0

COMPUTATIONAL MECHANICS CO INC AUSTIN TX

(U) Computational Methods for Nonlinear Dynamics Problems in Solid and Structural Mechanics: Models of Dynamic Frictional Phenomena in Metallic Structures.

DESCRIPTIVE NOTE: Final rept. 1 Feb 84-1 Feb 86,

MAR 86 343P

PERSONAL AUTHORS: Oden,J. T. ;

REPORT NO. TR-86-02

CONTRACT NO. F49620-84-C-0024

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-2015

UNCLASSIFIED REPORT

ABSTRACT: (U) In this report the dynamic behavior of metallic bodies subjected to dry frictional contacts is studied. A simple model of interface response which incorporates a constitutive equation for the normal deformability of the interface and the Coulomb law of friction is developed. This interface model is incorporated in the formulation of problems in continuum mechanics that invlove the contact of linearly elastic or viscoelastic bodies. Variational formulations for these problems are established and existence and uniqueness results are proved for steady-sliding and dynamic frictionless or frictional contact problems. The same interface model is also incorporated in finite dimensional models for contact problems: a simple rigid body model and finite element space discretizations of the continuum models. Numerical studies steady sliding and its dynamic stability are presented, as well as numerical studies of friction-induced oscillations. In the latter case, the Newmark method and the central-difference technique are used to integrate numerically the equations of motion. In the numerical studies particular emphasis is given to the role played by normal degree-of-freedom in frictional sliding.

AD-A174 598

AD-A174 585

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 585 CONTINUED

DESCRIPTORS: (U) *SLIDING FRICTION, DRY MATERIALS, NUMERICAL ANALYSIS, INTERFACES, STRUCTURAL MECHANICS, DAMPING, CONTINUUM MECHANICS, RIGIDITY, FINITE ELEMENT ANALYSIS, MATHEMATICAL MODELS, VIBRATION, OSCILLATION

IDENTIFIERS: (U) WUAFOSR2302B1, Pe61102F

AD-A174 584 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL INST OF STATISTICS

(U) Adapting for Heteroscedasticity in Regression Models.

DESCRIPTIVE NOTE: Technical rept. Aug 85-Aug 86,

JUL 86 33P

PERSONAL AUTHORS: Carroll,Raymond J. ;Ruppert,David ; Stefanski,Leonard A. ;

REPORT NO. MIMEO SER-1702

CONTRACT NO. F49620-85-C-0144, NSF-MCS81-00748

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2063

UNCLASSIFIED REPORT

ABSTRACT: (U) This document investigates the limiting behavior of a class of one-step M-estimators in heteroscedastic regression models. The mean function is assumed to be known up to parameters, but the variance function is considered an unknown function of a dimensional vector. The variance function is to be estimated nonparametrically by a function of the absolute residuals from the current fit to the mean. Under a variety of conditions when the estimates adapt for scale, i.e., the regression parameter is estimated just as well as if the scale function was known. Connections with the theory of optimal semiparametric estimation are made. (Author)

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *REGRESSION ANALYSIS, ESTIMATES, NONPARAMETRIC STATISTICS, LEAST SQUARES METHOD, RESIDUALS

IDENTIFIERS: (U) Heteroscedasticity

AD-A174 585

AD-A174 584

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 583 .8 10/0

KENTUCKY UNIV LEXINGTON DEPT OF CIVIL ENGINEERING

(U) Three-Dimensional Elasto-Plastic Analysis for Soils.

DESCRIPTIVE NOTE: Annual rept. 15 Aug 85-14 Aug 86,

SEP 86 153P

PERSONAL AUTHORS: Hardin,Bobby O. ;Blandford,George E. ;

CONTRACT NO. AFOSR-84-0195

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-86-1059

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents the second year accomplishments perfecting the elasto-plastic constitutive equations of Hardin (1978) and their implementation into EPSAP (Elasto-Plastic Soil Analysis Program). Essential features of soil behavior that result from the soil skeleton being particulate are included in the soil model. It is recognized that plastic behavior of particulate materials depends on direction of effective stress increment as well as state of effective stress. Two classes of stress increment directions are defined with different plastic potential and hardening functions for each class. Work has been directed toward: (1) modeling soil strength in terms of effective stress; (2) modeling work softening behavior for class 1 plastic hardening; (3) modeling class 2 plastic hardening; (4) modeling the class 1 plastic potential function for cyclic loading; (5) possible use of undrained triaxial compression test data for clays; (6) implementation into the finite element program of constitutive models; (7) introduction of two new elements into the analysis program, a modified eight node hexahedron finite element and an eight node infinite element; and (8) improvement of the nonlinear finite element solution strategy.

DESCRIPTORS: (U) *SOIL MODELS, *SOIL MECHANICS, STRESS ANALYSIS, ELASTIC PROPERTIES, PLASTIC PROPERTIES, NONLINEAR ANALYSIS, FINITE ELEMENT ANALYSIS, THREE

AD-A174 583 CONTINUED

DIMENSIONAL, STRESSES, DIRECTIONAL, DYNAMIC LOADS, SOIL DYNAMICS, SOILS, PARTICULATES, STRENGTH(MECHANICS), TRIAXIAL STRESSES, HARDENING, COMPRESSIVE PROPERTIES, CLAY, MATHEMATICAL MODELS, COMPUTER PROGRAMS, ALGORITHMS

IDENTIFIERS: (U) Elastoplasticity, EPSAP computer program, Cyclic loads, Constitutive equations, Plastic hardening, Soil strength

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 580 .9 1/0.20 12/0

CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Development of a Planar Heterojunction Bipolar Transistor for Very High Speed Logic.

DESCRIPTIVE NOTE: Interim rept. 1 Mar-29 Jun 86,

OCT 86 18P

PERSONAL AUTHORS: Long,Stephen I. ;Kroemer,Herbert ;Rao,M. A. ;

CONTRACT NO. AFOSR-82-0344

PROJECT NO 2305

TASK NO. C1

MONITOR: AFOSR TR-86-2009

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also report dated 28 Mar 86, AD-A170 063.

ABSTRACT. (U) Graded regions of n-(Ga,In)As and p-Ga(As, Sb) were incorporated side-by-side as emitter and base contacts respectively, into an npn (Al,Ga)As/GaAs heterostructure bipolar transistor (HBT). The process involved two separate MBE growths, leading to base contact regions that were self-aligned to the emitter mesas. The devices could be easily probed with pressure contacts even prior to any metallization, and excellent characteristics were obtained after final metallization.

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *ALUMINUM GALLIUM ARSENIDE, *N TYPE SEMICONDUCTORS, *HETEROJUNCTIONS, *BIPOLAR TRANSISTORS, *LOGIC CIRCUITS, EPITAXIAL GROWTH, FABRICATION, MOLECULAR BEAMS, P TYPE SEMICONDUCTORS

IDENTIFIERS: (U) HBT(Heterostructure Bipolar Transistors), Indium arsenides, Base contacts, Ohmic contacts, Contacts(emitter), Metallization, PE61102F, WUAFOSR2305C1

AD-A174 580

AD-A174 579 .9 3/0.20 9/0

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL ENGINEERING

(U) The Role of the Plasma during Laser-Gas Laser-Metal Interactions.

DESCRIPTIVE NOTE: Annual rept. 11 Feb 85-30 Sep 86,

OCT 86 193P

PERSONAL AUTHORS: Rockstroh,Todd J. ;Mazumder,Jyotirmoy ;

REPORT NO. UILU-ENG-86-4011

CONTRACT NO. AFOSR-83-0041

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-86-1052

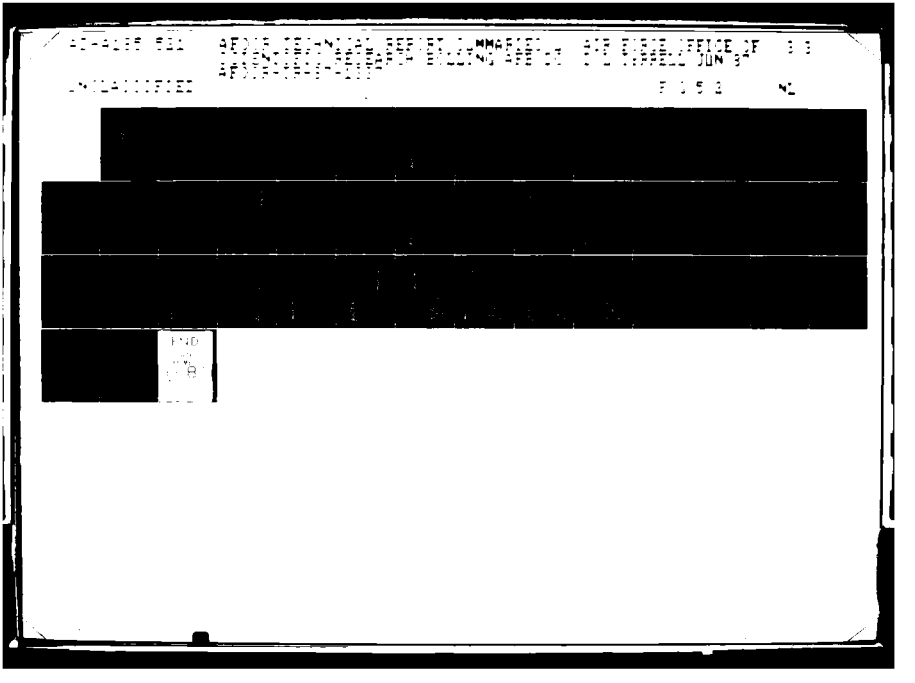
UNCLASSIFIED REPORT

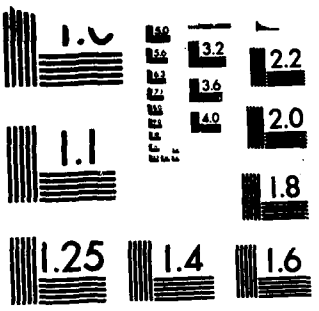
ABSTRACT: (U) The regime of CW laser-plasma-target interactions at intensities below 10 million W sq cm has been overlooked except for a few studies of gas assist configurations. The recent advances in industrial laser material processing and modeling efforts warrant a detailed study of laser-plasma-target interactions. The 10 KW CW CO2 laser facility has been used to study both pure gas and metal gas plasmas. Spectroscopic diagnostics have been applied to measure temperature in the plasma core where local electron temperatures are in excess of 10,000 K.

DESCRIPTORS: (U) *LASER TARGET INTERACTIONS, *PLASMAS(PHYSICS), TRANSPORT PROPERTIES, METALS, LASER BEAMS, CONTINUOUS WAVE LASERS, SPECTRUM ANALYSIS, TARGETS, ALUMINUM, BREMSTRAHLUNG, BREAKDOWN(ELECTRONIC THRESHOLD), ION ENGINES, DIAGNOSIS(GENERAL), ARGON

IDENTIFIERS: (U) Laser produced plasmas, PE61102F, WUAFOSR2308A1

AD-A174 579





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 575 .6 4/0.23 2/0

EEG SYSTEMS LAB SAN FRANCISCO CA

(U) Neuroelectric Predictors of Performance Accuracy.

DESCRIPTIVE NOTE: Final rept. 30 Sep 85-31 Mar 86,

JUL 86 24P

PERSONAL AUTHORS: Gevins,Alan S. ;

CONTRACT NO. AFOSR-85-0361

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-86-0675

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) Brain electrical patterns of seven right-handed adults were found to be different preceding accurate and inaccurate performance. Activity overlying the left frontal cortex and the motor and parietal corteces contralaterial to the performing hand characterized subsequently accurate left- or right-hand performance. Additionally, strong activity overlying supplementary motor and premotor corteces preceded left-hand performance. Group patterns significantly distinguished subsequently accurate or inaccurate performance by individuals. These measurements suggest that brief, spatially distributed neural activityh patterns, or 'preparatory sets', recorded from distinct cognitive, somesthetic-motor, and integrative motor areas of the human brain may be essential precursors of accurate visumotor performance. These precursors of performance accuracy were not present in even highlyh enhanced conventional averaged evoked potentials. Our findings suggest that important functional relations between areas of the human brain may be characterized by measuring the similarity of wave shape and timing between appropriately preprocessed low-frequency brain waves recorded from different channels at the scalp.

AD-A174 575 CONTINUED

DESCRIPTORS: (U) ELECTROENCEPHALOGRAPHY, COGNITION, NEUROPHYSIOLOGY, PERFORMANCE(HUMAN), ACCURACY, PRECURSORS, COVARIANCE, RESPONSE(BIOLOGY), VISUAL CORTEX, MOTOR REACTIONS, VISUAL PERCEPTION, CUES(STIMULI), HANDS, PERFORMANCE TESTS, ACCURACY, PREPROCESSING, PREPARATION, NEURAL NETS, HUMANS, ADULTS

IDENTIFIERS: (U) Handedness, Visuomotor performance, Evoked potentials, Neuroelectric activity, Preparatory sets, WUAFOSR2313A4, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 573 .12 3/0.13 8/0

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Distributions with Monotone Failure Rate.

86 12P

PERSONAL AUTHORS: Barlow,R. E. ;Proschan,F. ;

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2006

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the International School of Physics, p12-22 1986.

ABSTRACT: (U) An interesting practical as well as theoretical question is the following: Under which reliability operations is the class of IFR DFR (Increasing (Decreasing) Failure Rate) distributions closed? For example, is the convolution of IFR distributions an IFR distribution? To answer this question we need to introduce some concepts form total positivity.

DESCRIPTORS: (U) *RELIABILITY, FAILURE, PROBABILITY DENSITY FUNCTIONS, FUNCTIONAL ANALYSIS, RATES, REPRINTS

IDENTIFIERS: (U) Monotone functions, WUAFOSR234A5, PE61102F

AD-A174 573

AD-A174 572 .9 5/0.20 8/1.20 12/0

HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER

(U) Thin-Film Optoelectronic Circuits Research Program.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 85-30 Jun 86,

JUL 86 45P

PERSONAL AUTHORS: Arnold,Steven M. ;

CONTRACT NO. F49620-85-C-0050

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-86-1094

UNCLASSIFIED REPORT

ABSTRACT: (U) Monolithic integration of electronic circuits in silicon has made possible a revolution in electronic computation and signal processing. Today, gallium arsenide integrated circuits (GaAs ICs) are extending this electronic revolution to ever higher speed devices. Optical signal processing, despite its consistent advances and several early successes such as synthetic aperture radar and the optical spectrum analyzer, is falling increasingly behind the electronic competition. Functions which formerly required the speed and parallelism of optics are now being implemented entirely in digital electronics. the reasons for this are several, but one in particular stands out: the lack of emphasis given to compatibility issues between optical and electronic IC fabrication processes. As a result, most integrated optic devices demonstrated to date have been discrete components requiring laborious interfacing to predominantly electronic systems.

DESCRIPTORS: (U) *THIN FILMS, *ELECTROOPTICS, *WAVEGUIDES, *GALLIUM ARSENIDES, *SILICON, *INTEGRATED CIRCUITS, SYNTHETIC APERTURE RADAR, SIGNAL PROCESSING, COUPLING(INTERACTION), PHOTODETECTORS

IDENTIFIERS: (U) Optoelectronic Circuits, Vertical Confinement, Integrated Optics, Delta Beta Switches,

AD-A174 572

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 572 CONTINUED

Gallium Arsenides, Waveguides(Thin Film), Zinc Monoxide, Channel Guides, Mach Zenter Switches, WUNAFOSR2305B1, PE61102F

AD-A174 569 .12 1/0

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) Fractional Factorial Designs in the Form of Incomplete Orthogonal Arrays.

DESCRIPTIVE NOTE: Interim rept.,

JUL 86 18P

PERSONAL AUTHORS: Hedayat,A. S. ;Stufken,J. ;

REPORT NO. TR-86-06

CONTRACT NO. AFOSR-85-0320

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2058

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper we study certain fractional factorial designs, which are known in the literature as incomplete orthogonal arrays. We indicate situations in which these designs can be of practical interest and study both some of their mathematical, as well as statistical properties.

DESCRIPTORS: (U) *FACTORIAL DESIGN, POLYNOMIALS, MATHEMATICAL MODELS, ARRAYS, ORTHOGONALITY, SYMMETRY

IDENTIFIERS: (U) Incomplete Orthogonal Arrays, WUAFOSR2304A5, Pe61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 561 .12 1/0

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) A Note on Estimation with Quantized Data,

DEC 85 4P

PERSONAL AUTHORS: Liu,Yih-Chiao ;Wise,Gary L. ;

CONTRACT NO. AFOSR-81-0047, AFOSR-86-0026

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2056

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Acoustics, Speech, and Signal Processing, vASSP-33 n6 p1619-1621 Dec 85.

ABSTRACT: (U) Conditional expectations often arise in estimation schemes. However, in many practical situations, the estimation would be based upon quantized data. This paper investigates the degradation in the estimation caused by the quantization of the data. Some numerical examples are given to illustrate the results.

DESCRIPTORS: (U) *ESTIMATES, *DATA REDUCTION, *QUANTIZATION, RANDOM VARIABLES, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 561

AD-A174 553 .11 6/1

ILLINOIS UNIV AT URBANA DEPT OF MATERIALS SCIENCE

(U) Rapid Solidification Processing and Powder Metallurgy of Al Alloys.

DESCRIPTIVE NOTE: Final technical rept. 15 Apr 82-15 Apr 86,

OCT 86 78P

PERSONAL AUTHORS: Fraser,Hamish L. ;

CONTRACT NO. AFOSR-82-0186

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-86-1099

UNCLASSIFIED REPORT

ABSTRACT: (U) Regarding work on the development of microstructure during rapid solidification, three areas have been addressed. The first of these involved a determination of the mechanism of formation of the so-called zones A and B in hyper-eutectic AL-transition metal alloys. The second area of work involving the development of microstructure concerns submerged phase transformations. In a study of AL-Be hyper-eutectic alloys, it was determined that solidification proceeded by a set of phase transformations that may be described by a monotectic reaction. The third area of study concerning microstructural development involves quasi-crystalline AL alloys. In fact, work done in this program has concentrated on the potentially beneficial aspects of quasi-crystalline phases in the microstructure of AL alloys. Work on the consolidation of particulate has concentrated on the use of conventional techniques (.e. extrusion) and novel processes (i.e. dynamic compaction). An estimate of the mechanical properties of rapidly solidified AL alloys has been obtained. As explained above, the effect of extrusion is to cause decomposition of the rapidly solidified microstructure. A comparison has been made, using the alloy AL-8Fe-2Mo, between the tensile properties of the decomposed microstructure (.e. extruded) and sub-scale test specimens produced by laser

AD-A174 553

AD-A174 553 CONTINUED

surface melting, consisting entirely of zone A.

DESCRIPTORS: (U) *POWDER METALLURGY, *SOLIDIFICATION, *ALUMINUM ALLOYS, MICROSTRUCTURE, EUTECTICS, PHASE TRANSFORMATIONS, CRYSTALS, EXTRUSION, IRON, MOLYBDENUM, TENSILE PROPERTIES

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1

AD-A174 553

AD-A174 552 .20 10/0

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Hyperpolarizabilities of Hydrogen Fluoride Molecule: A Discrepancy Between Theory and experiment?

MAR 86 9P

PERSONAL AUTHORS: Sekino,Hideo ;Bartlett,Rodney J. ;

CONTRACT NO. AFOSR-85-0011

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-86-0440

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v 84 n5 p2728-2732, 1 Mar 86.

ABSTRACT: (U) Due to the recent availability of an experimental value for the second- and third-order electric polarizabilities of the HF molecule, possible errors in the previous prediction of these quantities have been considered. These include basis sets, vibrational corrections, frequency dependence, infinite-order correlation corrections, and the effect of triple excitations. Despite the inclusion of all of these effects, the discrepancy between experiment and theory remains. Possible additional corrections are considered with emphasis on basis set completeness. Considering the difficulty in predicting such sensitive quantities, this is rather good agreement. The paper also addresses questions of reliability of ab initio calculations for such high-order properties as hyperpolarizabilities, while identifying some places where the experimental results are susceptible to error.

DESCRIPTORS: (U) *HYDROGEN FLUORIDE, *POLARIZATION, QUANTUM THEORY, EXPERIMENTAL DATA, OPTICAL PROPERTIES, ERRORS, EXCITATION, MOLECULAR VIBRATION, CORRECTIONS, HARTREE FOCK APPROXIMATION, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4

AD-A174 552

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 548 .20 3/0

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Fabrication of Material and Devices for Very High Density Information Storage.

DESCRIPTIVE NOTE: Rept. no. 1 (Final) Jan-Dec 85,

NOV 86 15P

PERSONAL AUTHORS: Kryder,Mark H. ;Thuel,David ;Bowman, Chris ;Huang,Ching-Hsing ;

CONTRACT NO. AFOSR-85-0100

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-86-1082

UNCLASSIFIED REPORT

ABSTRACT: (U) An ion beam deposition system was purchased and utilized for research on magnetic materials and devices for high density magnetic information storage. Initial work was carried out on the deposition of permalloy and the deposition of magnetic oxides. The work on permalloy revealed that ion beam deposited materials generally had smaller grain size and lower coercivity than R.F. sputtered materials. It was also found that the grain size and coercivity of ion beam deposited materials increased of a second ion gun were used to bombard the substrate during the deposition process. This work is being continued with support from other sources. The work on magnetic oxides was begun with the deposition of cobalt ferrite. X ray diffraction measurements indicate the material deposited was amorphous and exhibited a hard axis of anisotropy perpendicular to the plane of the film. This work is also being continued with support from other sources.

DESCRIPTORS: (U) *MAGNETIC ALLOYS, *MEMORY DEVICES, *MAGNETIC FILM MEMORIES, ION BEAMS, DEPOSITION, SPUTTERING, MAGNETOOPTICS, GRAIN SIZE, COBALT COMPOUNDS, FERRITES, AMORPHOUS MATERIALS, X RAY DIFFRACTION, NICKEL ALLOYS, IRON ALLOYS

AD-A174 548

AD-A174 548 CONTINUED

IDENTIFIERS: (U) Permalloy, PE61102F, WUAFOSR291783

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 545 .12 3/0

NATIONAL RESEARCH COUNCIL WASHINGTON DC COMMISSION ON PHYSICAL SCIENCES MATHEMATICS AND RESOURCES

(U) Renewing U.S. Mathematics; Critical Resource for the Future.

DESCRIPTIVE NOTE: Final technical rept.,

APR 86 217P

PERSONAL AUTHORS: Kasper,Raphael ;

CONTRACT NO. AFOSR-83-0328

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-86-2053

UNCLASSIFIED REPORT

ABSTRACT: (U) In recent years, the group within the National Research Council that oversees our work in the physical sciences became concerned that the nation was not taking full advantage of the potential of the mathematical sciences. Accordingly, the council empaneled a group of outstanding scientists, many of whom, including the panel chairman, Edward David, represent scientific fields that use the results of mathematical research. The panel's task was to assess the adequacy of U.S. resources in support of mathematics. Renewing U.S. Mathematics is the product of that assessment. The panel discovered that recent funding increases in the computer sciences actually mask a downward trend in federal support for mathematics itself. The report lays out a bold remedial program that the panel believes is needed if we are to keep the mathematical sciences in the United States at the world forefront. We should not take for granted the broad practical payoff that derives from advances in pure and applied mathematics. I hope this report will play a part in helping the government, the public, and the scientific community itself to understand the risks we take if we neglect this crucial resource.

DESCRIPTORS: (U) *APPLIED MATHEMATICS, STATISTICS, OPERATIONS RESEARCH, ENGINEERING, RESOURCE MANAGEMENT

AD-A174 545 CONTINUED

IDENTIFIERS: (U) PE61103F, WUAFOSR2304A1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 544 .20 4/0

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Active Feedback Interaction with a Shear Layer.

DESCRIPTIVE NOTE: Annual progress rept. Jun 85-Jun 86,

JUN 86 26P

PERSONAL AUTHORS: Dimotakis,P. E. ;Koochesfahani,M. M. ;

CONTRACT NO. AFOSR-84-0120

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-86-1034

UNCLASSIFIED REPORT

ABSTRACT: (U) Work continues on the characterization of the effects of a pitching airfoil on the shear layer structure and growth under open loop forcing. We have shown that locally introduced disturbances can induce significant changes in the growth of the shear layer mixing zone. A separate investigation into the structure of the wake of an oscillating airfoil in a steady, uniform free stream revealed the existence of an axial flow along the cores of the wake vortices. The magnitude of the axial flow appears to depend on both the frequency and amplitude of oscillation.

DESCRIPTORS: (U) *AIRFOILS, *TURBULENT FLOW, *WAKE, SHEAR PROPERTIES, PITCH(MOTION), OSCILLATION, AIR FLOW, MIXING, VORTICES, FREE STREAM, AXIAL FLOW, UNSTEADY FLOW, CORES, FEEDBACK, INTERACTIONS, CONTROL, FREQUENCY, AMPLITUDE, LAYERS, TURBULENCE, OPEN LOOP SYSTEMS, FLOW VISUALIZATION

IDENTIFIERS: (U) Shear flow, Unsteady airfoils, Active control, Oscillating airfoils, WUAFOSR2307A2, PE61102F

AD-A174 544

AD-A174 538 .12 3/0

PRINCETON UNIV NJ DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Dynamic Realizations of Sufficient Sequences,

SEP 85 8P

PERSONAL AUTHORS: Dickinson,Bradley W. ;Sontag,Eduardo D. ;

CONTRACT NO. AFOSR-84-0381

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0820

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Information Theory, vIT-31 n5 p870-878 Sep 85. Prepared in cooperation with Rutgers Univ., Brunswick, NJ. Dept. of Mathematics, Contract AFOSR-80-0198.

ABSTRACT: (U) Let (U1,U2,...) be a sequence of observed random variables and (T1,(U1), T2, (U1,U2),...) be a corresponding sequence of sufficient statistics (a sufficient sequence). Under certain regularity conditions, the sufficient sequence defines the input/output map of a time varying, discrete time nonlinear system. This system provides a recursive way of updating the sufficient statistic as new observations are made. Conditions are provide assuring that such a system evolves in a state space of minimal dimension. Several examples are provided to illustrate how this notion of dimensional minimality is related to other properties of sufficient sequences. The results can be used to verify the form of the minimum dimension (discrete time) nonlinear filter associated with the autoregressive parameter estimation problem.

DESCRIPTORS: (U) *REGRESSION ANALYSIS, *SEQUENCES(MATHEMATICS), PROBABILITY DENSITY FUNCTIONS, RECURSIVE FUNCTIONS, INPUT OUTPUT PROCESSING, MAPPING(TRANSFORMATIONS), NONLINEAR SYSTEMS, DISCRETE DISTRIBUTION, ESTIMATES

AD-A174 538

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 538 CONTINUED

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

AD-A174 537 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL

(U) Optimal Bandwidth Selection in Nonparametric Regression Function Estimation,

85 18P

PERSONAL AUTHORS: Haerdle,Wolfgang ;Marron,James S. ;

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-86-2067

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The Annals of Statistics, v13 n4 p1465-1481 1985.

ABSTRACT: (U) Kernel estimators of an unknown multivariate regression function are investigated. A bandwidth selection rule is considered, which can be formulated in terms of cross validation. Under mild assumptions on the kernel and the unknown regression function, it is seen that this rule is asymptotically optimal.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *REGRESSION ANALYSIS, KERNEL FUNCTIONS, ASYMPTOTIC NORMALITY, SELECTION, ESTIMATES, OPTIMIZATION, NONPARAMETRIC STATISTICS, REPRINTS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 534 .12 3/0

ARIZONA UNIV TUCSON DEPT OF MATHEMATICS

(U) On the First Passage Times of Pure Jump Processes.

DESCRIPTIVE NOTE: Technical rept.,

AUG 86 16P

PERSONAL AUTHORS: Shaked,Moshe ;Shanthikumar,J. G. ;

CONTRACT NO. AFOSR-84-0205

PROJECT NO. 2304

TASK NO. K3

MONITOR: AFOSR
TR-86-2002

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with California Univ., Berkeley. School of Business Administration.

ABSTRACT: (U) Let T sub x be the time it for a pure jump process, which starts at 0, to cross a threshold x > 0. Sufficient conditions on the parameters of this process under which T sub x has increasing failure rate average, increasing failure rate or logconcave density are identified.

DESCRIPTORS: (U) *PROBABILITY DENSITY FUNCTIONS, FAILURE, POISSON DENSITY FUNCTIONS

IDENTIFIERS: (U) Jump Processes, Gamma Processes, IFRA(Increasing Failure Rate Average). PE61102F, WUAFOSR2304K3

AD-A174 534

AD-A174 532 .11 6/1

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE

(U) Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.

DESCRIPTIVE NOTE: Interim technical rept., 1 Oct 84-30 Sep 85,

JAN 86 58P

PERSONAL AUTHORS: Aaronson,H. I. ;Dalley,A. M. ;Furuhara, T. ;Lee,H. J. ;Nityanand,N. ;

CONTRACT NO. AFOSR-84-0303

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-86-2010

UNCLASSIFIED REPORT

ABSTRACT: (U) A TEM study of the interphase boundary structure of proeutectoid alpha plates in a Ti-7.15% Cr alloy has shown that both the broad faces and edges of the plates are partially coherent. At the broad faces, misfit dislocations are 1/3 < 1120 > whereas at the edges they are 1/3 < 1123 >. For normal alpha plates, the dislocations are ca. 20nm apart at the broad faces and 8 nm. apart at the edges. At black plates, the low temperature morphological variant of proeutectoid alpha, the dislocations are ca. 35nm. apart. Growth ledges are typically 100 - 350 nm. apart at the broad faces of normal plates and ca. 700 nm. apart on black plates. A detailed O-lattice analysis has demonstrated that a simple correlation between the misfit dislocation and the growth ledge structures does not exist. Growth kinetics studies of grain boundary allotriomorphs in Ti-3.9 w/o Co and Ti-7.15 w/o Cr have shown for the first time that the rejector plate mechanism is operative when the matrix phase has a bcc crystal structure. As previously predicted, however, this mechanism accelerates growth substantially less at a given homologous temperature than previous work has shown it to do in fcc matrices. The feasibility of detailed fundamental studies of the

AD-A174 532

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 532 CONTINUED

influence of beta grain size upon the development of Widmanstatten alpha sideplates has been demonstrated. Preliminary observations have been made on sideplate evolution from grain boundary allotriomorphs by both local morphological instability and sympathetic nucleation.

DESCRIPTORS: (U) *TITANIUM ALLOYS, *PHASE TRANSFORMATIONS, BAINITE, EUTECTICS, GRAIN BOUNDARIES, PLATES, CHROMIUM, DISLOCATIONS, CRYSTAL STRUCTURE, MORPHOLOGY, GROWTH(GENERAL), KINETICS, COBALT, GRAIN SIZE, STABILITY, NUCLEATION, PEARLITE

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1

AD-A174 530 .11 2/0.20 2/0.20 13/0

PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS RESEARCH LAB

(U) Ultra-Low Thermal Expansion Ceramics.

DESCRIPTIVE NOTE: Final rept. Jul 83-Jun 86,

AUG 86 16P

PERSONAL AUTHORS: McKinstry,H. A. ;Agrawal,D. K. ;Lenain, G. E. ;Vikram S. Y. /Limaye,C. S. ;

CONTRACT NO. AFOSR-83-0291

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-86-2060

UNCLASSIFIED REPORT

ABSTRACT: (U) The crystal chemistry, synthesis, and thermal expansion investigation of NZP-family was completed--in that M superscript1Zr2P3012 (M superscript1 = Li, Na, K, Rb, Cs), M superscript11Zr4P6024 = Mg, Ca, Sr, Ba) and a few more compositions were studied. Single crystals of (NZP) and (CZP) were grown, and high-temperature x-ray measurements were made on these crystals to test the validity of a structural model to interpret thermal expansion data. The possibility of the development of a glass-ceramic of NaGe2P3012 was explored. Dielectric measurements made on CaZr4P6024 revela that in general (NZP)-materials have a low dielectric constant. Three new families, namely diborides (ZrB2, TiB2, and CrB2), Al203-GeO2 system and perovskite Pb(Mg1/3Nb2/3)03 were investigated in order to search for any new low thermal expansion composition, but not much success was achieved in this direction, except that some perovskite compositions displayed low alpha behavior at low temperatures.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *THERMAL EXPANSION, CRYSTAL STRUCTURE, SYNTHESIS, ALKALI METAL COMPOUNDS, ALKALINE EARTH COMPOUNDS, ZIRCONIUM, PHOSPHORUS, OXYGEN, SINGLE CRYSTALS, CRYSTAL GROWTH, GERMANIUM COMPOUNDS, DIELECTRICS, MEASUREMENT, BORIDES, PEROVSKITES

AD-A174 530

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 528 .12 3/0

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) Sampling Plans Excluding Contiguous Units.

DESCRIPTIVE NOTE: Technical rept.,

AUG 86 18P

PERSONAL AUTHORS: Hedayat,A. S. ;Rao,C. R. ;Stufken,J. ;

REPORT NO. 86-13

CONTRACT NO. F49628-85-C-0008, AFOSR-85-0320

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2061

UNCLASSIFIED REPORT

ABSTRACT: (U) This document fixed size sampling plans for which the second order inclusion probabilities are zero for pairs of contiguous units and constant for pairs of noncontiguous units. A practical motivation for the use of such plans is pointed out and a statistical condition is identified under which these plans are more efficient than the corresponding simple random sampling plans. Results on the existence and construction of these plans are obtained.

DESCRIPTORS: (U) *STATISTICAL SAMPLES, ESTIMATES, CORRELATION TECHNIQUES, POPULATION, MATHEMATICAL MODELS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A174 528

AD-A174 525 .12 9/0

NORTHEASTERN UNIV BOSTON MA

(U) Asynchronous Discrete Control of Continuous Processes.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 82-31 Dec 85,

FEB 86 199P

PERSONAL AUTHORS: Kaliski,Martin E. ;

CONTRACT NO. F49620-82-C-0080

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-86-2052

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) This research concerns the analysis and synthesis of asynchronous systems that contain discrete-state feedback compensators for continuous state plants. New tools for characterizing both the interfaces and the signals present in these intrinsically hybrid systems were developed. Generalizations of automata theory to real number alphabets were pursued and the application of semigroup theory to the dynamics of such systems has allowed for novel approaches for characterizing the internal state of asynchronous systems to be derived. A simulator for these 'asynchronous machines' has been written and allows us to bridge the gap between ideal systems, on one hand, and systems with physically constrained processing times, on the other.

DESCRIPTORS: (U) *CODING, *ASYNCHRONOUS SYSTEMS, *CONTROL THEORY, *FEEDBACK, AUTOMATA, SWITCHING, COMPENSATION, HYBRID SYSTEMS, INTERFACES, CONTROL SYSTEMS, TIME SIGNALS, SIMULATORS, REAL TIME, MULTIPLE OPERATION, MATHEMATICAL ANALYSIS

IDENTIFIERS: (U) Automata theory, Discrete control, Switching theory, Continuous processes, Feedback control, Asynchronous coders, PE61102F, WUAFOSR2304A1

AD-A174 525

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 524 .12 9/0.20 6/0

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Optical Signal Processing Using Non-Linear Optics.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 84-30 Nov 85,

APR 86 10P

PERSONAL AUTHORS: Steier,William H. ;

CONTRACT NO. AFOSR-84-0207

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-86-2011

UNCLASSIFIED REPORT

ABSTRACT: (U) The 2-D correlation/convolution which can be achieved in real time via four wave mixing in nonlinear materials has been investigated in detail to determine the accuracy and signal power investigated in detail to determine the accuracy and signal power possible. This analysis was initiated under other support; the experimental confirmation was completed under this contract. The analysis which is based on Fourier transforms of the equations of non-linear interaction has resulted in a closed form solution for the output and clearly shows how it differs from the desired 2-D correlation. In the example of a scene that is searched for given objects, the accuracy decreases as the ratio of scene to object size increases. The accuracy also resulting in a trade-off between accuracy, size of scanned scene, and power or signal to noise ratio in the output. The analysis was confirmed experimentally in a colinear four wave interaction in the photorefractive material bismuth silicon oxide at 5145 A. The accuracy of the correlation between relatively simple patterns was measured and agreed well with the prediction of the analysis.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *OPTICAL PROCESSING, *SIGNAL PROCESSING, *CONVOLUTION, *CORRELATORS, *PROCESSING EQUIPMENT, TWO DIMENSIONAL, FOURIER TRANSFORMATION, SCANNING, SIGNAL TO NOISE RATIO,

AD-A174 524 CONTINUED

POLARIZATION, ORTHOGONALITY, ARGON LASERS, OPTICAL PUMPING, HELIUM NEON LASERS, LASER BEAMS, OPTICAL MATERIALS, ACCURACY

IDENTIFIERS: (U) Optics(Nonlinear), Mixing(Four Wave), Convolvers(Optical), Wave Mixing(Four), Waves(Pumping), Beams(Read), Materials(Nonlinear), Carbon Disulfide, Beams(Write), WUNAFOSR2305B4, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 523 .12 3/0

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Confidence Bands under Proportional Hazards.

DESCRIPTIVE NOTE: Technical rept.,

AUG 86 27P

PERSONAL AUTHORS: Hollander,Myles ;Pena,Edsel ;

REPORT NO. FSU-STATISTICS-M743, TR-86-196-AFOSR

CONTRACT NO. F49620-85-C-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2066

UNCLASSIFIED REPORT

ABSTRACT: (U) Asymptotic simultaneous confidence bands are derived for the survival function under the proportional hazards model of random right-censorship. These bands are based on the maximum likelihood estimater of the survival function, rather than the well-known product limit estimater. In the case where the censoring parameter, denoted by beta, is known the bands are asymptotically exact, while when beta is unknown the bands are asymptotically conservative. For the case where beta is unknown, the proposed bands are shown to be narrower than those proposed by Cheng and Chang (1985). Csorgo and Korvath's (1986) idea of mixing bands is then employed to obtain even narrower bands. As one would expect, under the more structured model, the PLE-based band of Gillespie and Fisher (1979) is shown to be inferior to the MLE-based bands, and this inferiority is more marked as the degree of censoring increases.

DESCRIPTORS: (U) *FUNCTIONS(MATHEMATICS), *MATHEMATICAL MODELS, SURVIVABILITY, ASYMPTOTIC NORMALITY, MAXIMUM LIKELIHOOD ESTIMATION, WEAK CONVERGENCE, STATISTICAL SAMPLES

IDENTIFIERS: (U) *Confidence bands, Koziol green model, WUAFOSR2304A5, Pe61102F

AD-A174 523

AD-A174 521 .9 3/0.20 7/0.20 9/0

DARTMOUTH COLL HANOVER N H DEPT OF PHYSICS AND ASTRONOMY

(U) High Power, Millimeter-Wavelength, Coherent Radiation Sources.

DESCRIPTIVE NOTE: Final rept. 1 Feb 82-31 Jan 86,

SEP 86 72P

PERSONAL AUTHORS: Walsh,John E. ;

REPORT NO. 86-0168

CONTRACT NO. AFOSR-82-0168

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-86-1089

UNCLASSIFIED REPORT

ABSTRACT: (U) A summary of the results of the Cerenkov Maser development is presented. During the course of this work, operation over the spectral range extending from just below 30 GHz to just above 300 GHz was demonstrated. Sources based upon high-power microwave-tube technology and sources driven by pulse-power generators were both used to drive Cerenkov Masers. In the former type, 10% efficiency from single-pass, untapered resonators were obtained, while in the latter, efficiency was in the 0.1-1% range. Extensive computer codes describing linear and nonlinear aspects of Cerenkov Master operation were also developed.

DESCRIPTORS: (U) *MASERS, *CERENKOV RADIATION, *ELECTRON BEAMS, *COHERENT ELECTROMAGNETIC RADIATION, *SOURCES, *DIELECTRIC AMPLIFIERS, FAR INFRARED RADIATION, MILLIMETER WAVES, NONLINEAR SYSTEMS, PULSE GENERATORS, FREE ELECTRONS, DISPERSION RELATIONS, MICROWAVE OSCILLATORS, RESONATORS, SUBMILLIMETER WAVES, GRATINGS(SPECTRA), GAIN, EFFICIENCY, HIGH POWER, THESES

IDENTIFIERS: (U) Cerenkov masers, High power masers, Cylindrical waveguides, Untapered resonators, Mode locked

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AD-A174 521 CONTINUED

plasmas, Lined waveguides, Plasma diagnostics, SLAB waveguides, Quasi optics, Beam diagnostics, Free electron masers, Rectangular waveguides, Open resonators, Van Der Pol theory, Relativistic beams, WUAFOSR2301A8, PE61102F

AD-A174 520 .20 4/0.21 2/0

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 85-29 Sep 86,

OCT 86 21P

PERSONAL AUTHORS: Toong,Tau-Yi ;

CONTRACT NO. AFOSR-83-0373

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-2071

UNCLASSIFIED REPORT

ABSTRACT: (U) Simultaneous measurements of velocity (in a direction normal to the flame brush) and temperature in premixed, od-stabilized, lean methane/air V-flames demonstrated the presence of high-frequency fluctuations within slowly drifting flame brushes, thus indicating a structure different from that of a simple wrinkled-laminar flame. Both the velocity and the temperature fluctuations gave maximum RMS values at a position somewhere between the unreacted and the product gases. Furthermore, cross-correlation coefficients of these simultaneous signals assumed rather high values within the reaction zone, suggesting the possibility that these fluctuation might be induced by the same governing mechanism (which, according to the theory reported previously, was due to the coupling between chemical kinetics and turbulence). A paper on the genesis of transverse waves in gaseous detonations was published in Combustion and Flame. A manuscript on the thermal structure of turbulent flames was submitted for presentation at the Fall Technical Meeting of the Eastern Section of the Combustion Institute. Another manuscript on turbulence-combustion interactions was in preparation.

DESCRIPTORS: (U) *COMBUSTION, *FLAME PROPAGATION, *TURBULENCE, *SUBSONIC FLOW, *SUPERSONIC FLOW, CHEMICAL REACTIONS, METHANE, AIR, FUELS, FLAMES, BRUSHES, VELOCITY,

AD-A174 521

AD-A174 520

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 520 CONTINUED

TEMPERATURE, TRANSVERSE WAVES, DETONATIONS, REACTION KINETICS, HIGH FREQUENCY

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F

AD-A174 518 .11 2/0.20 2/0

HUGHES RESEARCH LABS MALIBU CA

(U) Optical Fibers for Nonlinear Optics.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-15 Jul 86,

OCT 86 50P

PERSONAL AUTHORS: Rand,S. C. ;

CONTRACT NO. F49620-84-C-0043

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-86-1096

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The main objective of this contract has been to find methods of fabricating single-crystal nonlinear optical fibers. Successful techniques were to be utilized to make crystal fibers useful for nonlinear optical devices, particularly devices exploiting second order optical nonlinearities. Device concepts and applications were also to be formulated. This work was initially divided into three parts. The first of these emphasized materials purification, characterization, and the measurement of physical and chemical properties of materials used in the fabrication of single-crystal and nonlinear fibers. The second task explored a variety of methods of production of single-crystal (SC) fibers, recognizing that one method can be applied, even in principle, to SC fiber growth of all materials of interest. The third task in this program involved the measurement of optical properties of the fabricated fibers and development of device applications.

DESCRIPTORS: (U) *SINGLE CRYSTALS, *GLASS, *FIBER OPTICS, *NONLINEAR SYSTEMS, REFRACTIVE INDEX, HARMONIC GENERATORS, LIQUIDS, AMMONIUM COMPOUNDS, PHOSPHATES, FABRICATION

IDENTIFIERS: (U) Phase matching, ...escent waves,

AD-A174 518

AD-A174 520

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 518 CONTINUED

Nonlinear optics, DTA(Differential Thermal Analysis), Hybrid fibers, Three wave mixing, Ammonium dihydrogen phosphates, WUAFOSR2301A1, PE61102F

AD-A174 517 .12 3/0

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) On the Mean Squared Error of Nonparametric Quantile Estimators under Random Right-Censorship.

DESCRIPTIVE NOTE: Technical rept.,

SEP 86 14P

PERSONAL AUTHORS: Lio,Y. L. ;Padgett,W. J. ;

REPORT NO. TR-122

CONTRACT NO. AFOSR-84-0158, MIPR-ARO-139-85

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2055

UNCLASSIFIED REPORT

ABSTRACT: (U) For randomly right-censored data, new asymptotic expressions for the mean squared errors of the product-limit quantile estimator and a kernel-type quantile estimator are presented in this paper. From these results a comparison of the two quantile estimators with respect to their mean squared errors is given. (Author)

DESCRIPTORS: (U) *NONPARAMETRIC STATISTICS, *PROBABILITY DISTRIBUTION FUNCTIONS, *ESTIMATES, ASYMPTOTIC NORMALITY, MEAN, ERRORS, KERNEL FUNCTIONS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 516 .6 5/0.12 3/0

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Inference on the Occurence/Exposure Rate and Simple Risk Rate.

DESCRIPTIVE NOTE: Technical rept.,

AUG 86 26P

PERSONAL AUTHORS: Bai,Z. D. ;Krishnaiah,P. R. ;Yin,Y. Q. ;

REPORT NO. TR-86-18

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2057

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper, studies the asymptotic distributions of the functions of the occurrence/exposure rate. Asymptotic distributions of functions of the simple risk rates are also derived. The results are useful in not only medical research but also in the area of reliability.

DESCRIPTORS: (U) *BIOSTATISTICS, *EXPOSURE(PHYSIOLOGY), *RISK, *COMMUNICABLE DISEASES, RATES, MEDICAL RESEARCH, ASYMPTOTIC NORMALITY, RELIABILITY, MULTIVARIATE ANALYSIS

IDENTIFIERS: (U) Berry Esseen Theorem, WUAFOSR2304A5, PE61102F

AD-A174 516

AD-A174 515 .20 4/0.21 2/0

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) An Investigation of Flow Structure, Mixing and Chemical Reaction in Combusting Turbulent Flows.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 85-31 Aug 86,

OCT 86 11P

PERSONAL AUTHORS: Bowman,Craig T. ;Cantwell,Brian J. ;

CONTRACT NO. AFOSR-84-0373

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-86-1033

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The principal objective of this experimental investigation of the relationship between flow structure and chemical reaction in turbulent reacting flows is to examine the spatial structure of the unsteady reaction process as it relates to the unsteady velocity field. The configuration studied is a coflowing, non-premixed jet flame. A small perturbation in the fuel jet velocity, produced acoustically, is used to create a very periodic and controllable flame, suitable for conditional sampling. Initial measurements of the unsteady velocity field in the flame have been obtained using laser anemometry. In addition, flow visualization experiments have been conducted using direct and schlieren photography and Mie scattering from seed particles introduced into the flow. Planar laser-induced fluorescence images of the OH radical, which provide spatially and temporally resolved information on the instantaneous location of the reaction zone, have been obtained. A particle tracking technique to facilitate acquisition of velocity field data is being developed.

DESCRIPTORS: (U) *TURBULENT FLOW, *COMBUSTION, *FLAMES,

AD-A174 515

AD-A174 515 CONTINUED

MIXING, CHEMICAL REACTIONS, REACTION KINETICS, MATHEMATICAL PREDICTION, VELOCITY, UNSTEADY FLOW, TIME DEPENDENCE, HYDROCARBONS, METHANE, AIR FLOW, STRUCTURAL PROPERTIES, HYDROXYL RADICALS, LASER ANEMOMETERS, FLOW VISUALIZATION

IDENTIFIERS: (U) Reacting Flows, Flow Structure, Jet Flows, WUAFOSR2308A2, PE61102F

AD-A174 512

MISSOURI UNIV-ST LOUIS DEPT OF PHYSICS

(U) Fundamental Quantum 1/F Noise in Ultrasmall Semi Conductor Devices and Their Optimal Design Principles.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 May 85-31 Apr 86,

MAY 86 40P

PERSONAL AUTHORS: Handel,Peter H. ;

CONTRACT NO. AFOSR-85-0130

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR TR-86-2012

UNCLASSIFIED REPORT

ABSTRACT: (U) A second-quantized derivation of the quantum (1/f) effect was developed. This derivation is based on the pair correlation function and automatically includes the right form of exchange between fermions and between bosons. Also for the first time a direct calculation of the effect of a finite mean free path was performed. This calculation justifies the calculation of quantum (1/f0 noise and results in a correction factor of the order of the unity. As a first step of a more general study of (1/f) in semiconductor devices (n+-p) diodes have been investigated with emphasis on (HgCdTe) photodetectors. Quantum (1/f) noise has been calculated in the surface and bulk recombination currents, in the diffusion and field currents, and in the tunneling currents. Due to the large localized electric field at the surface, a larger fractional quantum (1/f) noise power is obtained for surface recombination currents than for similar bulk recombination currents. All quantum (1/f) noise calcualtions are first principles calculations with no free parameters, based on the quantum (1/f) effect in scattering and recombination cross sections, as well as in tunneling rates.

DESCRIPTORS: (U) *QUANTUM ELECTRONICS, *SEMICONDUCTORS, *NOISE(ELECTRICAL AND ELECTROMAGNETIC), EXCHANGE REACTIONS, FERMIONS, BOSONS, PHOTODETECTORS, CADMIUM

AD-A174 512 CONTINUED

TELLURIDES, MERCURY COMPOUNDS, TUNNELING(ELECTRONICS), RECOMBINATION REACTIONS, TRANSPORT PROPERTIES

IDENTIFIERS: (U) Quantum Noise, Mean Free Pata, Quantum 1/f Noise, WUAFOSR2305C1, PE61102F

AD-A174 500 .12 3/0

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Theory of Conditioning in Point Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 85-Sep 86,

SEP 86 11P

PERSONAL AUTHORS: Kallenberg,Olav ;

REPORT NO. TR-152

CONTRACT NO. F40620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2064

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper, written for the Proceedings of the First World Congress of the Bernoulli Society of Mathematical Statistics and Probability in Tashkent, 1986, summarizes the most fundamental concepts and relationships in the theory of conditioning in point processes. Though most results are taken from the author's book on Random Measures or from an earlier survey paper, the present emphasis is somewhat different, and there are even a couple of new results, mentioned here without proof. By a point process we mean a random configuration of isolated points in some topological space. Point processes arise naturally in a great variety of contexts, both theoretical and applied.

DESCRIPTORS: (U) *POINTS(MATHEMATICS), STOCHASTIC PROCESSES, PROBABILITY DISTRIBUTION FUNCTIONS, CONFIGURATIONS, TOPOLOGY, KERNEL FUNCTIONS

IDENTIFIERS: (U) PE61102F, WUAFSOR2304A5

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 497 .20 4/0.21 5/0

CINCINNATI UNIV OH DEPT OF AEROSPACE ENGINEERING AND APPLIED MECHANICS

(U) Analysis of Three-Dimensional Viscous Internal Flows.

DESCRIPTIVE NOTE: Final rept. 1 Mar 80-28 Feb 85,

DEC 85 57P

PERSONAL AUTHORS: Ghia,Kirti N. ;Ghia,Urmila ;

REPORT NO. AFL-85-12-70

CONTRACT NO. AFOSR-80-0160

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-86-2059

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this study was to acquire improved understanding of viscous interanl flows related to turbomachinery compents by analyzing appropriate model flow problems. Significant effort was directed towards developing basic computational methods which were made available to interested researchers involved in computational fluid dynamics (CFD) research and to users involved in the designof turbomachinery components. Several analyses were developed and include an asymptotic analysis for the fully developed three-dimensional flow in curved ducts, a parabolized navier-Strokes analysis for developing flow in curved ducts, an unsteady Navier-Strokes analysis for internal and externall flows, adaptive grid generation for one and two dimensional vilscous flows, analysis of the Neumann problem in generalized orthogonal coordinates, efficient semi-implicit solution techniques consisting of the alternating direction implicit multi grid and strongly implicit multi grid methods, the direct block Gaussian elimination(GBE) method for solution of the Poisson equation for the unsteady Navier Strokes analysis of incompressible flows. For the flow inside a shear driven cavity, the asymptotic flow in curved ducts and clarity for interpretation of the available corresponding

AD-A174 497 CONTINUED

experimental results and have now become benchmark solutions for these problems.

DESCRIPTORS: (U) *TURBOMACHINERY, *VISCOUS FLOW, *INTERNAL FRICTION, NAVIER STOKES EQUATIONS, TURBULENT FLOW, LAMINAR FLOW, INCOMPRESSIBLE FLOW, FLOW SEPARATION, SECONDARY FLOW, UNSTEADY FLOW, TURBULENCE, CHANNEL FLOW, DUCTS

IDENTIFIERS: (U) Neumann problem, Parabolic differential equations, BGEC(Block Gaussian Elimination), Backstep channels, PE61102F, WUAFOSR2307A4

AD-A174 497

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 493 .20 11/0

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MECHANICAL ENGINEERING

(U) Fundamental Studies in Fatigue and Fracture Mechanics. Phase 1.

DESCRIPTIVE NOTE: Final rept. 15 Jan 85-14 Apr 86 on Phase 1,

OCT 86 88P

PERSONAL AUTHORS: Sinclair,G. B. ;

REPORT NO. SM-86-13

CONTRACT NO. AFOSR-85-0030

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR TR-86-1077

UNCLASSIFIED REPORT

ABSTRACT: (U) The basic tenet of fracture mechanics is that the stress intensity factor, K, controls fracture and fatigue: here the former claim is critically examined. The underlying supporting argument - the original energy argument of Griffith and the more modern K-controlled region view - are considered. These considerations demonstrate that there are questionable assumptions in both, so that the viability of K as a damage parameter for fracture has to be established by the physical evidence. The first question then is whether or not the critical value of K, K sub Ic, is a material parameter: checking data shows it need not be. The second question is can the technology be usefully predictive, even in the most simple of situations: checking the data shows it to be unreliable in this role. At this time then, it remains to ask similar questions concerning the role of K in fatigue crack growth and, certainly for the monotonic loading case, develop alternatives: these are the objectives of the second phase of the program.

DESCRIPTORS: (U) *FRACTURE(MECHANICS), *FATIGUE(MECHANICS), STRESS ANALYSIS, CRACKING(FRACTURING)

AD-A174 493

AD-A174 493 CONTINUED

, CRACK PROPAGATION, TOUGHNESS, FINITE ELEMENT ANALYSIS, MATHEMATICAL PREDICTION

IDENTIFIERS: (U) *Stress intensity factor, Reissner theory, LEFM(Linear Elastic Fracture Mechanics), PE61102F, WUAFOSR2302B2

AD-A174 493

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 492 .20 6/0.20 12/0

GTE LABS INC WALTHAM MA

(U) High Speed Low Power Nonlinear Optical Signal Processing.

DESCRIPTIVE NOTE: Final technical rept. 26 May 84-26 Jul 86,

SEP 86 107P

PERSONAL AUTHORS: Dagenais,Mario ;Sharfin,Wayne F. ;

CONTRACT NO. F490620-84-C-0052

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-86-1093

UNCLASSIFIED REPORT

ABSTRACT: (U) During the two-year period of this contract, substantial progress was made in the understanding of both the linear and the nonlinear optical properties of direct gap semiconductors and in the implications for high speed, low power, nonlinear optical signal processing. In particular, the detuning and the temperature dependence of the damping of an exciton-polariton was obtained for the first time. The lowest single beam switching energy (< 4 pJ) and the fastest reported ON/OFF switching (< 1 ns) bistable device with clearly resolved stable states was demonstrated using the nonlinearity associated with bound excitons in CdS. Thermal effects on the millisecond and microsecond time scales were experimentally studied. Optical bistability due to induced absorption near the free and bound exciton was experimentally studied with and without a Fabry-Perot cavity. Large degenerate four-wave mixing signals were observed near free and bound excitons in CdS at cryogenic temperatures. Nonlinear transmission signals were studied at different detunings below the free exciton resonance and at temperatures up to 120 K. These signals were interpreted in terms of a broadening of the free exciton resonance by exciton-exciton collisions. The quantum confined stark shifting of a quantum dot was performed for the first time. A new

AD-A174 492

AD-A174 492 CONTINUED

generation of efficient optical modulators is envisioned. (Author)

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *OPTICAL PROCESSING, *MIXING, *EXCITONS, *CADMIUM SULFIDES, *STARK EFFECT, *OPTICAL SWITCHING, *SEMICONDUCTORS, BAND THEORY OF SOLIDS, KINETIC ENERGY, PHOTONS, MASS, LINEAR SYSTEMS, CRYOGENICS, COUPLING(INTERACTION), SIGNAL PROCESSING, RESONANCE, FABRY PEROT INTERFEROMETERS, PLATES, POLARIZATION

IDENTIFIERS: (U) Bound excitons, Quantum dots, Confined stark effect, Quantum wires, Optical bistability, Free excitons, Broadening(Collision), Degeneracies, Polaritons, Four Wave Mixing, Nonlinear optics, Intrinsic spectrum, Valence bands, Conduction bands, Hexagonal crystals, PE61102F, WUAFOSR2305B4

AD-A174 492

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 487 .12 1/0

FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYSTEM THEORY

(U) Mathematical Techniques for System Realization and Identification.

DESCRIPTIVE NOTE: Final rept. 1 Jun 81-31 Mar 85,

FEB 86 11P

PERSONAL AUTHORS: Kalman,R. E. ;

CONTRACT NO. AFOSR-81-0238

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-0958

UNCLASSIFIED REPORT

ABSTRACT: (U) Since its establishment in 1972, research at the Center for Mathematical System Theory has generated over 100 published papers. At the same time, the Center has served as a focal point for a considerable part of the system-theoretic research in the U.S. and elsewhere, through an active visitor program and through recruitment of outstanding doctoral students. This is especially true for the development and application of advanced algebraic and algebraic-geometric technique in the system-theoretic context. The Center is an interdisciplinary, interdepartmental group, a basic function of which is to provide coordination and collaboration between advanced mathematics and engineering.

DESCRIPTORS: (U) *APPLIED MATHEMATICS, *AIR FORCE RESEARCH, BIBLIOGRAPHIES, ENGINEERING, THEORY, RESEARCH MANAGEMENT

AD-A174 487

AD-A174 479 .7 4/0.21 2/0.21 9/0

RENSSELAER POLYTECHNIC INST TROY NJ DEPT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING

(U) Combustion Kinetics of Metal Oxide and Halide Radicals and Metal Atoms.

DESCRIPTIVE NOTE: Final rept. 1 Dec 81-30 Nov 85,

JAN 86 14P

PERSONAL AUTHORS: Fontijn,Arthur ;

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-86-0855

UNCLASSIFIED REPORT

ABSTRACT: (U) To help provide a better understanding of the temperature dependence of the kinetics of diatomic metal radical oxidation reactions, experimental measurements were made in the 450 to 1750 K temperature regime. An HTFFR (high-temperature fast-flow reactor) was used. The metal radical concentrations were measured by laser-induced fluorescence. The general uses of this spectrometric technique for rate measurements on reactants and products, as well as for product species identification and product state determination, are reviewed. The radicals studied in the HTFFR on this grant are ALo, AlCl and BCl. Production methods for these are discussed. For the reaction AlO + CO yields AlO2 AlO + AlO2 + CO we obtain k(T) = 2.5 X 10 to the minus 14th power exp (400/T) cc/molecules/s. This negative activation energy implies D(O-AlO) > D(O-CO) = 530 kj/mol, which is in apparent disagreement with the OAlO dissociation energy obtained for AlO2 from Al2O3 evaporation-mass spectrometry studies. It is argued that the latter AlO2 may have a different structure from that of the present work. For the reaction between AlCl and O2 we find k(T) = 6.8 X 10 to the minus 13th power exp(-2990/T) + 1.5 X 10 to the minus 10th power exp(-10600/T) cc/mol/s, which is compatible with a mechanisms where the AlO2 + Cl product channel dominates at lower temperatures, while the OAlCl + O channel dominates at higher temperatures. The ln k(T) versus dependence of the AlCl/

AD-A174 479

AD-A174 479 CONTINUED

02 reaction is contrasted to those observed for AlO/02 and BF/02 reactions.

DESCRIPTORS: (U) *HALIDES, *MONOXIDES, *OXIDATION, *COMBUSTION, *METAL COMPOUNDS, REACTION KINETICS, CHEMICAL RADICALS, CONCENTRATION(CHEMISTRY), ROCKET RAMJETS, LASER INDUCED FLUORESCENCE, SPECTROMETRY, HIGH TEMPERATURE, COMBUSTION PRODUCTS, ALUMINUM OXIDES, ALUMINUM COMPOUNDS, CHLORIDES, BORON COMPOUNDS, ACTIVATION ENERGY, CHEMICAL DISSOCIATION, RECOMBINATION REACTIONS, SLURRIES, ROCKET PROPELLANTS

IDENTIFIERS: (U) Metal halides, Metal oxides, Temperature dependence, Metal radicals, Aluminum chlorides, Boron chlorides, Metallized propellants, Monohalide radicals, Combustion kinetics, PE61102F, WUAFOSR2308A1

AD-A174 465 .20 6/0

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Optical Data Processing.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 83-30 Sep 85,

OCT 85 139P

PERSONAL AUTHORS: Casasent,David ;

CONTRACT NO. AFOSR-84-0293

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-86-1000

UNCLASSIFIED REPORT

ABSTRACT: (U) Research on optical data processing for missile guidance and robotics is described. Our major emphasis is pattern recognition using feature extraction (Fourier coefficients, moments and chord features) and correlation (using distortion-invariant synthetic discriminant function matched spatial filters). All research in pattern recognition concerns multi-class distortion-invariant pattern recognition. Recent research includes: different feature extraction post-processors, new algorithms to extract distortion parameters from chord features and a hierarchical moment feature processor for distortion parameter estimation. Extensive database tests of moments and synthetic discriminant functions have been performed. Component research has addressed AO cells with performance measures and detector effects described. Matrix-vector research includes: error source analysis, a new quadratic matrix algorithm, and initial laboratory system results with attention to the electronic support system and the laboratory system fabrication. (Author)

DESCRIPTORS: (U) *OPTICAL PROCESSING, *PROCESSING EQUIPMENT, *PATTERN RECOGNITION, *HOLOGRAPHY, DATA PROCESSING EQUIPMENT, CORRELATORS, GUIDANCE, MOMENTS, MATCHED FILTERS, ERRORS, ALGORITHMS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 465 CONTINUED

IDENTIFIERS: (U) Acoustooptics, Synthetic discriminants, Chords, Extraction(Feature), Discriminant functions, Coefficients(Fourier), Optical algebra, Post processors, Linear algebras, Optical recognition, Distortion estimation, Robotics, WUAFOSR230581, PE61102F

IAC NO. GC-870171

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)Data processing, Optical processors, Pattern recognition, Holography, Correlators, Errors, Algorithms, Acoustooptics, Guidance, Matched filters, Extraction, Coefficients, Linear algebraic equations, Distortion.;

AD-A174 464 .7 4/0.9 3/0

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) Theory of Laser-Induced Phenomena on Conventional and Phase-Conjugated Surfaces,

NOV 86 37P

PERSONAL AUTHORS: Lin,J. T. ;Huang,Xi-Yi ;George,Thomas F. ;

REPORT NO. UBUFFALO/DC/86/TR-18

CONTRACT NO. N00014-86-K-0043, F49620-86-C-0009

MONITOR: AFOSR
TR-87-0335

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser induced processes on conventional and phase conjugated surfaces are investigated theoretically. Resonance fluorescence of two level atoms on smooth and rough surfaces are reviewed. The new phenomenon of a radiative dipole at a phase conjugated surface (PCS) is examined, where the lifetime of the dipole an virtually be infinite under certain conditions. PCS originates from the interference of two laser beams incident on an absorbing layer and is discussed in terms of a phenomenological model and a hydrodynamic theory, where laser-induced periodic structure and the PCS reflectivity are analyzed. Finally, practical applications of these new phenomena occuring on PCS are discussed.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *LASER PUMPING, *SURFACE CHEMISTRY, RESONANCE RADIATION, DIPOLE MOMENTS, REFLECTANCE, SURFACE ROUGHNESS, REFLECTIVITY, ADATOMS, STARK EFFECT

IDENTIFIERS: (U) Phase conjugation, PCS(Phase Conjugated Surfaces), Four wave mixing

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 463 .8 11/0.19 9/0

NEW MEXICO ENGINEERING RESEARCH INST ALBUQUERQUE

(U) An Application of Signal Analysis and Pattern Recognition to Study a Simple Ground Motion Problem.

DESCRIPTIVE NOTE: Final rept. Feb 82-Jul 85,

AUG 86 62P

PERSONAL AUTHORS: Carson,James M. ;

REPORT NO. NMERI-20

CONTRACT NO. AFOSR-82-0102

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR TR-86-1076

UNCLASSIFIED REPORT

ABSTRACT: (U) A simple problem involving the identification of an explosive source as being unbermed or bermed using a pattern recognition based analysis of buried ground accelerometer measurements is presented. This problem illustrates the advantages of computerized information extraction from the measured waveforms. Information was extracted from the frequency and cepstrum descriptions of the waveforms in addition to the more traditional time domain information. These signal features were incorporated into a Fisher's Linear Discriminant pattern recognition procedure. Previously unseen signals were classified with up to 100% accuracy depending on which features were used. Close in explosive source measurements present unique problems to a pattern recognition based analysis approach. These problems are reviewed and approaches illustrated.

DESCRIPTORS: (U) *SEISMIC WAVES, *PATTERN RECOGNITION, *GROUND MOTION, ACCELEROMETERS, EXPLOSION EFFECTS, SEISMIC DATA, SIGNAL PROCESSING, WAVE ANALYZERS, TIME DOMAIN, FREQUENCY, CEPSTRUM TECHNIQUE, DISCRIMINATE ANALYSIS, EXTRACTION, CLASSIFICATION, BLAST LOADS

IDENTIFIERS: (U) Fishers Linear Discriminant, Signal

AD-A174 463

AD-A174 463 CONTINUED

Analysis, Feature Extraction, Frequency Domain, WUNAFOSR2307C1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 461 .11 1/0.21 5/0

MASSACHUSETTS INST OF TECH CAMBRIDGE GAS TURBINE AND PLASMA DYNAMICS LAB

(U) Fluid Dynamic - Structural Interactions of Labyrinth Seals.

DESCRIPTIVE NOTE: Final rept. 1 Dec 82-30 Nov 83,

JUN 86 33P

PERSONAL AUTHORS: Martinez-Sanchez,Manuel ;Dugundji,John ;

CONTRACT NO. AFOSR-83-0034

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-86-2004

UNCLASSIFIED REPORT

ABSTRACT: (U) AIn analytical model was formulated for the calculation of unsymmetrical pressure distributions inside the cavities of a multi-stage labyrinth seal. The model is based on a set of linearized continuity and momentum equations for the throughflow, and can account for the effects of rotation, whirl, flow swirl, differential gap width and (limited) compressibility. Preliminary calculations show excellent agreement with non-whirling side-force data in the literature. Also, models are being constructed that will permit calculation of the effect of these seal forces on the running stability of flexible, highly loaded turbomachines, with the Space Shuttle Main Engine serving as the prototype of such machines.

DESCRIPTORS: (U) *ROTARY SEALS, *GAS TURBINES, SPACECRAFT COMPONENTS, PRESSURE SEALS, BEARINGS, TURBOPUMPS, SPACE SHUTTLES, STIFFNESS, DAMPING

IDENTIFIERS: (U) *Labyrinth seals, Pade approximants, WUAFOSR2302B1, PE61102F

AD-A174 461

AD-A174 460 .14 2/0.17 1/0

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) The Air Force Office of Scientific Research for Low-Frequency Acoustic Microscope.

DESCRIPTIVE NOTE: Final rept.,

MAY 86 4P

PERSONAL AUTHORS: Khuri-Yakub,B. T. ;

REPORT NO. GL-4051

CONTRACT NO. AFOSR-84-0198

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-86-1080

UNCLASSIFIED REPORT

ABSTRACT: (U) Low-frequency acoustic microscopy has demonstrated a tremendous potential for the nondestructive evaluation of metals, composite materials, and structural ceramics. This proposal allowed us to build a new, improved instrument with which can make not only amplitude, but also phase, measurements. The addition of the phase measurement capability allows us to do two dimensional image processing to extract more information from our measurements than is presently done with amplitude only acoustic microscopes. Also, the addition of the phase measurement capability allows us to measure profiles of samples with great accuracies.

DESCRIPTORS: (U) *ACOUSTIC MICROSCOPES, *PHASE STUDIES, TWO DIMENSIONAL, NONDESTRUCTIVE TESTING, LOW FREQUENCIES, SURFACE PROPERTIES, METALS, COMPOSITE MATERIALS, CERAMIC MATERIALS, SINTERING

IDENTIFIERS: (U) WUAFOSR2917A3, PE61102F

IAC NO. NT-035581

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

AD-A174 460

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ58L

AD-A174 460 CONTINUED

IAC SUBJECT TERMS: N--(U)ACOUSTIC MICROSCOPY, LOW FREQUENCY, INSTRUMENTATION, DETECTION, FOCUSING, FOCUSED TRANSDUCERS, STRUCTURAL MATERIALS, PHASE, MEASUREMENT, IMAGE PROCESSING, DEVELOPMENT;

AD-A174 453 .12 3/0

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Adaptive Control of Discounted Markov Decision Chains.

DESCRIPTIVE NOTE: Technical Note,

JUN 85 10P

PERSONAL AUTHORS: Hernandez-Lerma,O. ;Marcus,S. I. ;

CONTRACT NO. F49620-77-C-0101, AFOSR-79-0025

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-86-0619

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Optimization Theory and Applications, v6 n2 p227-235 Jun 85.

ABSTRACT: (U) This paper considers discounted reward finite state Markov decision processes which depend on unknown parameters. An adaptive policy inspired by the nonstationary value iteration scheme of Federgruen and Schweitzer is proposed. This policy is briefly compared with the principle of estimation and control recently obtained by Schal.

DESCRIPTORS: (U) *DECISION THEORY, *MARKOV PROCESSES, ADAPTIVE CONTROL SYSTEMS, ITERATIONS, PARAMETERS, ESTIMATES, FEEDBACK, STOCHASTIC CONTROL, REPRINTS

IDENTIFIERS: (U) Markov chains, Nonstationary, Value Iterations, PE61102F, WUAFOSR2304A1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 451 .8 7/0.13 3/0.20 11/0

ARIZONA UNIV TUCSON DEPT OF CIVIL ENGINEERING

(U) Constitutive Modelling of Concrete and Rocks Under Multiaxial Compressive Loadings,

DESCRIPTIVE NOTE: Interim rept. Jan 85-Jan 86,

SEP 86 438P

PERSONAL AUTHORS: Salami,M. R. ;Desai,C. S. ;

CONTRACT NO. AFOSR-83-0258

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-86-2014

UNCLASSIFIED REPORT

ABSTRACT: (U) This research envisages development of constitutive models for joints in rock (concrete) subjected to cyclic loads. The objective is to implement the models in (numerical) solutions of boundary value problems involving solids and joints subjected to dynamic loads such as blastes and earthquake. Hence, it is appropriate to develop models for both the joints and the intact or solid (concrete) media in which the joints occurs. This report contains description of a new hierarchical plasticity-based constitutive model, laboratory testing using a multiaxial device and verification for the intact concrete used in the investigation.

DESCRIPTORS: (U) *ROCK MECHANICS, *JOINTS, *CONCRETE, BOUNDARY VALUE PROBLEMS, MATHEMATICAL MODELS, PLASTIC DEFORMATION, ELASTIC PROPERTIES, HIERARCHIES, LABORATORY TESTS, CYCLIC TESTS, LOADS(FORCES), TRIAXIAL STRESSES, STRESS STRAIN RELATIONS, COMPRESSIVE PROPERTIES, TENSILE STRENGTH, FAILURE(MECHANICS), THESES

IDENTIFIERS: (U) Constitutive models, Cyclic loading, Soapstone, Geologic materials, Multiaxial loading, PE61102F, WUAFOSR2302C1

AD-A174 451

AD-A174 450 .12 5/0

IOWA UNIV IOWA CITY OPTIMAL DESIGN LAB

(U) Computer-Aided Structural Design Optimization Using a Database Management System.

DESCRIPTIVE NOTE: Interim technical rept. Oct 84-Sep 85,

SEP 86 320P

PERSONAL AUTHORS: SreekantaMurthy,T. ;Arora,Jasbir S. ;

REPORT NO. ODL-85-17

CONTRACT NO. AFOSR-82-0322

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR TR-86-2069

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Doctoral thesis.

ABSTRACT: (U) A study was made to integrate finite element-based-optimal structural design methods and computer-science methods into a computer-based system containing a a database, a program library and man-machine communication link. Emphasis is placed upon database management concepts for structural design. Important components required to build a computer-aided structural design system are described. A number of database management concepts -- hieracrchical, network and relational data models, conceptual, internal and external view of data organization, normalization of data, and global and local database are discusses with reference to structural design data. A methodology to design a database is proposed. Three levels of data organization-conceptual, internal and external are suggested. A methodology to construct a numerical data model is described. This model supports data of various types of large matrices such as banded, skyline and hypermatrices. Requirements of database management system and components needed to develop it are discussed. Language requirements to enable good communication link between designer and computer are formulated. A database

AD-A174 450

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 450 CONTINUED

management system - MIDAS is implemented for use in structural design applications.

DESCRIPTORS: (U) *COMPUTER AIDED DESIGN, *SYSTEMS ENGINEERING, *DATA BASES, FINITE ELEMENT ANALYSIS, INTEGRATED SYSTEMS, OPTIMIZATION, STRUCTURAL ENGINEERING, COMPUTER PROGRAMS, FORTRAN, THESES

IDENTIFIERS: (U) Data base management systems, MIDAS(Management of Information for Design and Analysis of Systems), PE61102F, WUAFOSR2307B1

AD-A174 442 .8 10/0.20 11/0

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING

(U) A Self Consistent Estimate of the Elastic Constants of a Random Array of Equal Spheres with Application to Granular Soil under Isotropic Conditions.

DESCRIPTIVE NOTE: Final rept. 8 May 85-5 May 86,

JUL 86 125P

PERSONAL AUTHORS: Petrakis,Emmanual ;Dobry,Ricardo ;

REPORT NO. RPI-CE-86-04

CONTRACT NO. F49620-85-K-0011

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-86-1050

UNCLASSIFIED REPORT

ABSTRACT: (U) The need for a micromechanical approach to modeling the stress-strain response of granular soil is discussed and justified. The report focuses on the small shear strain (gamma < or = 0.01%) behavior, and investigates the validity of analytically modeling uniform, rounded-grained quartz sands by arrays of identical elastic quartz spheres. First the stress-strain properties of 8 regular arrays of spheres are studied, focusing on isotropic and transversely isotropic boundary loading. An analytical procedure is established for determining the elastic moduli of a random assemblage of equal elastic spheres of arbitrary mean porosity, subjected to isotropic confining pressure. The procedure uses the properties of the regular arrays already described, accounts for the spatial distribution of porosity, and calculates the macroscopic moduli through the self consistent method. The procedure was applied to compute the shear and bulk moduli of assemblages of quartz spheres which were then compared with static and dynamic measurements on quartz sands from the literature. The theoretical sands are significantly stiffer than actual soils due to the lower number of effective

AD-A174 442 CONTINUED

contacts in actual sands. However, excellent agreement was found with resonant column shear modulus measurements on Ottawa sand, after subjecting it to a large number of cycles of shear prestraining which increased the number of contacts toward the theoretical value.

DESCRIPTORS: (U) *SOIL MECHANICS, *SAND, *SOIL MODELS, STRESS STRAIN RELATIONS, SHEAR PROPERTIES, GRANULES, PRACTICLE SIZE, LOAD DISTRIBUTION, SPHERES, QUARTZ, ELASTIC PROPERTIES, CONSTANTS, TRANSVERSE, ISOTROPISM, BOUNDARIES, POROSITY, PARTICULATES, MODULUS OF ELASTICITY, VOIDS, RATIOS, ARRAYS, MATHEMATICAL MODELS, ESTIMATES, CONSISTENCY

IDENTIFIERS: (U) Micromechanical models, Small strains, Shear strain, Particulate mechanics, Granular soils, Self consistent method, Ottawa Sand, WUAFOSR2302C1, PE61102F

AD-A174 439 .7 3/0.20 5/0

NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) The Spectroscopy and Reaction Kinetics of Coordinated Unsaturated Metal Carbonyls.

DESCRIPTIVE NOTE: Annual rept. Oct 85-Oct 86,

OCT 86 7P

PERSONAL AUTHORS: Weitz,Eric ;

CONTRACT NO. AFOSR-83-0372

PROJECT NO. 2306

TASK NO. C4

MONITOR: AFOSR TR-86-1072

UNCLASSIFIED REPORT

ABSTRACT: (U) A program involving the investigation and characterization of reactions of coordinatively unsaturated organometallic species is described. The program emphasizes the measurement of rates of reaction of photolytically produced coordinatively unsaturated species with the parent and rates for cluster formation. Experimental measurements are performed using a time resolved transient absorption apparatus which uses a line tunable CO laser to record spectral and kinetic information by means of probing absorptions int he CO stretch region of the infrared. Systems that have been investigated include coordinatively unsaturated species generated from the Fe(CO)5, Cr(CO)6 and Mn2(CO)10 parents. The results of experiments with these systems are briefly discussed.

DESCRIPTORS: (U) *METAL COMPOUNDS, *CARBONYL COMPOUNDS, *REACTION KINETICS, *INFRARED SPECTROSCOPY, ORGANOMETALLIC COMPOUNDS, PHOTOLYSIS, CLUSTERING, TRANSIENTS, ABSORPTION SPECTRA, CARBON MONOXIDE LASERS, IRON COMPOUNDS, CHROMIUM COMPOUNDS, MANGANESE COMPOUNDS, TUNABLE LASERS

IDENTIFIERS: (U) Continuous Wave Lasers, Diode Lasers, WUAFOSR2306C4, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 436 .20 S/0.21 2/0

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Saturation and Spectral Line Behavior in the Resonant CARS Spectrum of OH.

DESCRIPTIVE NOTE: Final rept. 1 Dec 84-30 Apr 86,

MAY 86 35P

PERSONAL AUTHORS: Verdieck,J. F. ;Boedeker,L. R. ;

REPORT NO. UTRC/R86-957058F

CONTRACT NO. F49620-85-C-0014

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-86-1087

UNCLASSIFIED REPORT

ABSTRACT: (U) The origins of the unpredicted satellite lines about the central resonance of the CARS spectrum found in a previous study have been explored. The objectives of the program were to determine the dependence of the line structure on the input laser intensities and on tuning of the the resonant frequency. In the previous AFOSR-supported study, electronically resonant coherent anti-Stokes Raman spectroscopy (CARS) of OH was demonstrated for the first time using a flame source. Theory and experiment were in generally good agreement, except for the presence of satellite lines (extra resonances) about the strong central component. In order to investigate reliably the power dependence of the resonance CARS spectrum and thereby test for saturation effects, a single mode, pulsed, tunable dye laser was utilized to insure selective excitation of a single resonance. The resultant spectra show clearly that saturation occurs at input laser pulse energies of the resonant frequency of about 0.1 millijoules. Saturation effects are particularly apparent when the CARS pump frequency is on line center of the selected electronic transition. Tuning away from line center and/or reducing input pulse energy produces a notable decrease in the strength of the satellite lines relative to the central peak. The frequency splitting between the satellite components was determined to be independent of laser intensity and the tuning of the resonant CARS pump frequency relative to line center.

AD-A174 436 CONTINUED

DESCRIPTORS: (U) *RAMAN SPECTROSCOPY, *HYDROXYL RADICALS, *SATURATION, *SPECTRAL LINES, *COMBUSTION, RAMAN SPECTRA, COHERENT RADIATION, RESONANCE, TUNABLE LASERS, DYE LASERS, PULSED LASERS, EXCITATION, RESONANCE, RESONANT FREQUENCY, SPLITTING, ENERGY TRANSFER

IDENTIFIERS: (U) CARS(Coherent Antistokes Raman Spectroscopy), Combustion diagnostics, WUAFOSR2308A3, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 435 .11 6/1

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE

(U) Stress Corrosion Cracking of Wrought and P/M High Strength Aluminum Alloys.

DESCRIPTIVE NOTE: Final technical rept. 24 Aug 81-30 Jun 86,

SEP 86 239P

PERSONAL AUTHORS: Thompson,A. W. ;Bernstein,I. M. ;

REPORT NO. MEMS-AL-9

CONTRACT NO. AFOSR-81-0041

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-86-1090

UNCLASSIFIED REPORT

ABSTRACT: (U) The major findings from a comprehensive study on the role of microstructure on the susceptibility to environmental embrittlement of high strength aluminum alloys are presented and discussed. Most of the studies used commercial 7075, or a high purity equiaxed version, HP7075, or a similar powder version 7090. Through the innovative use of loading mode and straining electrode test, stress corrosion cracking was shown to be controlled by the introduction and internal distribution of hydrogen, particularly to grain boundaries. This was the case for the underaged and peak aged microstructures, with the latter being the most susceptible. The SCC behavior of the even more resistant overaged microstructure was shown to be controlled by anodic dissolution processes, predominantly associated with slip bands. Aluminum alloys were also shown to be susceptible to embrittlement under conditions of cathodic polarization correcting a widely held belief that concomitant anodic processes are required. Studies using controlled microstructures were able to rank the importance of different microstructural features to help develop alloy design strategies for more environmentally

AD-A174 435

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resistant alloys--the most effective features are those grain interior precipitates which promote fine, homogeneous slip either by reduced particle cutting or enhanced dislocation generation; fine, grain boundary precipitate free zones were found not to be very important, except in their role in reducing the local strength of the boundary region.

DESCRIPTORS: (U) *STRESS CORROSION, *ALUMINUM ALLOYS, *HIGH STRENGTH ALLOYS, POWDER METALLURGY, HYDROGEN EMBRITTLEMENT, MICROSTRUCTURE, GRAIN BOUNDARIES, AGING(MATERIALS), STRAIN RATE, DISLOCATIONS, CRACK PROPAGATION

IDENTIFIERS: (U) Stress corrosion cracking, Aluminum alloy 7075-T6, Aluminum alloy 7075, Aluminum alloy 7090, WUAFOSR2306A1, PE61102F

AD-A174 435

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 433 .13 9/0

NORTH STAFFORDSHIRE POLYTECHNIC STAFFORD (ENGLAND) DEPT OF MECHANICAL AND COMPUTER-AIDED ENGINEERING

(U) Vibration Control in Rotating Machinery Using Variable Dynamic Stiffness Squeeze Films. Volume 2.

DESCRIPTIVE NOTE: Annual interim rept. no. 1, Sep 84-Mar 86,

MAR 86 53P

PERSONAL AUTHORS: Goodwin,M. J. ;Roach,M. P. ;

CONTRACT NO. AFOSR-84-0368

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-86-1098-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A174 417.

ABSTRACT: (U) This report describes the current status of a research project whose aim is to develop a hydrostatic bearing, for rotating machinery, whose dynamic characteristics may be tuned during operation of the machine. The purpose of this is to enable the operator to exercise some control over machine critical speeds and vibrations. A computer program has been written which will predict both the static and dynamic characteristics of a hydrostatic bearing. The program allows for the presence of accumulators linked to the hydrostatic bearing recesses via flow restrictors. Output from the computer program has been used as input data to a second computer program which calculates machine vibration amplitude variation with running speed. Theoretical machine characteristics obtained in this way have been used to aid the design of a test rig which will be used to examine the practical performance of the new bearing type being developed.

DESCRIPTORS: (U) *GAS BEARINGS, *HYDROSTATIC PRESSURE, CONTROL, DYNAMIC LOADS, HYDRAULIC ACCUMULATORS, COMPUTER PROGRAMMING, TUNING, VIBRATION, DAMPING

AD-A174 433

AD-A174 433 CONTINUED

IDENTIFIERS: (U) Hydrostatic Bearings, Rotary equipment, Procasting, WUAFOSR2302B1, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 431

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Stable and Efficient 2-D Lattice Filters.

DESCRIPTIVE NOTE: Rept. for 1985-1986,

MAY 86 8P

PERSONAL AUTHORS: Lev-Ari,H. ;Parker,S. R. ;

CONTRACT NO. N00014-85-K-0612, AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-86-2001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International IEEE Symposium on Circuits and Systems, p695-698 May 86.

ABSTRACT: (U) A cascade lattice parameter filter for multidimensional signals is presented. It inherits the orthogonality property of the Gray Markel normalized lattice, which makes for improved numerical robustness, as well as the structural stability property, which means that the filter is stable for every choice of parameters that satisfies the constraint of orthogonality. An implementation of the lattice sections is presented which has multiple inputs and outputs, as networks of elementary (2x2) orthogonal rotations. Our analysis establishes a fundamental connection between structural stability and the notions of passivity and losslessness. In fact, we show that for a broad family of orthogonal cascade filters structural stability is achieved if, and only if, the filter has passive terminations.

DESCRIPTORS: (U) *ELECTROMAGNETIC WAVE FILTERS, *CASCADE STRUCTURES, *MATHEMATICAL MODELS, CIRCUIT ANALYSIS, TRANSFER FUNCTIONS, LATTICE DYNAMICS, REPRINTS

IDENTIFIERS: (U) Gray Markel Lattice, VLSI(Very Large Scale Integration), Robust Procedures, WUAFOSR2304A6, PE61102F

AD-A174 428 .12 2/0

CALIFORNIA UNIV RIVERSIDE DEPT OF STATISTICS

(U) Two New Series of Search Designs for 3(m) Factorial Experiments.

DESCRIPTIVE NOTE: Interim rept. Dec 85-Jun 86,

JUL 86 17P

PERSONAL AUTHORS: Ghosh,Subir ;Zhang,Xiao D. ;

REPORT NO. TR-144

CONTRACT NO. AFOSR-86-0048

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-2008

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper two new series of search designs with very small number of treatments are presented for 3 superscript m factorial experiments. The first series of designs can search one nonzero two factor interaction and estimate it along with the general mean and the main effects. The second series can search one nonzero three factor interaction and estimate it along with the two factor and lower order interactions.

DESCRIPTORS: (U) *FACTORIAL DESIGN, LINEAR ALGEBRA

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 428 .9 3/0.17 5/1

ARIZONA STATE UNIV TEMPE DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Research on Certain Aspects of Laser Diffraction Particle Size Analysis Relevant to Autonomous Self-Diagnosing Instrumentation.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 84-1 Oct 85,

OCT 85 10P

PERSONAL AUTHORS: Hirleman,E. D. ;Koo,Joseph H. ;

CONTRACT NO. AFOSR-84-0187

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-86-1086

UNCLASSIFIED REPORT

ABSTRACT: (U) The fundamental scientific issues impeding the integratain of laser diffraction particle sizing techniques into intelligent sensors for next generation propulsion systems have been identified. This research contributes to the knowledge base necessary to significantly advance the laser diffraction concept. The research addresses three areas, inverse scattering algorithms, multiple scattering, and the problems of laser beam deflections due to refractive index gradients in hostile propulsion environments. Progress has been made in the development of direct integral transform techniques for the inverse problem which potentially can operate at frequencies on the order of 10 kHz as needed for propulsion system sensors.Adequate inversion performance on bi modal distributions with signal to noise ratios as low as 10% has been demonstrated. The multiple scattering problem has been formulated as a matrix operation, and a corresponding scheme for the inversion of diffraction data under multiple scattering conditions has been proposed. A prototype computer generated hologram which generates a hollow cone of scattered light has been fabricated. Experiments are underway to demonstrate the usefulness of this development to the inverse multiple scattering problem.

AD-A174 428

AD-A174 428 CONTINUED

Finally, a concept to allow laser diffraction particle sizing sensors to function autonomously in environments where transient beam deflections are significant has been proposed and proof of principle experiments have begun.

DESCRIPTORS: (U) *LASER TARGET INTERACTIONS, *BACKSCATTERING, *PARTICULATES, *INFRARED SIGNATURES, DIFFRACTION ANALYSIS, SIZES(DIMENSIONS), COMBUSTION PRODUCTS, DATA REDUCTION, HOLOGRAMS, COMPUTER APPLICATIONS, SIGNAL TO NOISE RATIO, INTEGRAL TRANSFORMS, BEAM STEERING, LASER BEAMS

IDENTIFIERS: (U) Bimodal Distribution Functions, Multiple scattering, Inverse Problems, WUAFOSR2308A3, PE61102F

IAC NO. NT-035580

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U)TEST EQUIPMENT, SENSORS, PARTICLE SIZE, LASERS, DIFFRACTION, PROPULSION, SCATTERING, PROTOTYPES, HOLOGRAPHY, RESEARCH, DIAGNOSTICS, ENVIRONMENTAL EFFECTS, AUTOMATION, ARTIFICIAL INTELLIGENCE, ALGORITHMS, FORMULAS(MATHEMATICS), DEVELOPMENT, CALIBRATION, ON LINE SYSTEMS;

AD-A174 428

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 427 .7 4/0.12 9/0.20 6/0.20
12/0

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Signal Processing with Degenerate Four-Wave Mixing.

DESCRIPTIVE NOTE: Annual rept. 1984-1985,

AUG 86 14P

PERSONAL AUTHORS: Stegeman,George ;

CONTRACT NO. AFOSR-84-0277

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-86-1079

UNCLASSIFIED REPORT

ABSTRACT: (U) We have made progress in a variety of areas within this program since our original report of DFWM in a thin film waveguide. That original experiment utilized liquid carbon disulphide (CS2) as the nonlinear mixing medium in the form of a cladding on a planar sputtered 7059 glass waveguide. A number of obvious deficiencies exist in configuration: (a) the physical form of the nonlinear medium (ie a liquid is not very practical), (b) the optical field strength in the nonlinear medium is small since only the evanescent tails of the guided modes exist in the nonlinear cladding, and (c) the magnitude of the nonlinear index in CS2 n2approx, 10 to the minus 18th power per sq m per w is not particularly high. To improve upon these deficiencies what is required is a nonlinear material preferable in a practical solid form which can be formed into low loss optical waveguides. Semiconductor doped glasses were identified as an excellent candidate material to meet these requirements. This is a glass host containing mixtures of CdS and CdSe compounds semiconductor crystallites.

DESCRIPTORS: (U) *MIXING, *INFORMATION THEORY, *THIN FILMS, *CARBON DISULFIDE, *CADMIUM SULFIDES, *CADMIUM SELENIDES, *WAVEGUIDES, NONLINEAR SYSTEMS, LIQUIDS, REFRACTIVE INDEX, SEMICONDUCTORS, RESPONSE, DOPING,

AD-A174 427

AD-A174 427 CONTINUED

SPUTTERING, SUBSTRATES, IONS, SODIUM, POTASSIUM, OPTICAL PUMPING

IDENTIFIERS: (U) DFWM(Degenerate Four Wave Mixing), Conjugates, Waves(Debenerate), Mixing(Four wave), Cladding, Degeneracies, Nonlinear optics, Probe beams, Pulse responses, WUAFOSR2305B4, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 419 .7 3/0.19 1/0.20 5/0

DELAWARE UNIV NEWARK DEPT OF CHEMISTRY

(U) Structure/Property/Reactivity Relationships Among Nitramines and Newer Energetic Materials.

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-30 Sep 86,

OCT 86 14P

PERSONAL AUTHORS: Brill,Thomas B. ;

CONTRACT NO. AFOSR-85-0353

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-86-1088

UNCLASSIFIED REPORT

ABSTRACT: (U) Rapid-scan infrared spectroscopy studies of the high rate thermolysis of energetic molecules containing CNO2, NNO2, ONO2, N3, NO3(-), IR spectroscopy, DSC, solid-state NMR and X-ray crystallography have been conducted. Structure/property/reactivity relationships have been established for the formation of NO2 and HONO. Understanding of some of the factors influencing the formation of CH2O, N2O and NO has also been acquired. The influence of the static applied pressure on the first observed decomposition products has been explored successfully.

DESCRIPTORS: (U) *NITRAMINES, *ENERGETIC PROPERTIES, *PYROLYSIS, *INFRARED SPECTROSCOPY, NITRATES, ESTERS, CHLORATES, FUROXANES, SALTS, FUROXANES, PHASE TRANSFORMATIONS, SOLID PHASES, MOLECULAR STRUCTURE, AZIDES, NITRO RADICALS, PRESSURE, CRYSTALLOGRAPHY

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1

AD-A174 418 .12 3/0

ILLINOIS UNIV AT CHICAGO CIRCLE STATISTICAL LAB

(U) A-Optimal Block Designs for Comparing Test Treatments with a Control.

DESCRIPTIVE NOTE: Technical rept.,

JUL 86 12P

PERSONAL AUTHORS: Stufken,John ;

REPORT NO. TR-86-10

CONTRACT NO. AFOSR-85-0320

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-86-1092

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers the problem of comparing test treatments with a control in a proper block design. The auther derives sufficient conditions for the A-optimality of both R-type and S-type designs, and demonstrates how these conditions can be used to obtain families of optimal designs. He gives an example for the construction of the desired S-type designs. A table with optimal R-type designs (3 > or = k > or = 10, k > or = v > or = 30) is also given.

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, PARAMETERS, INEQUALITIES, OPTIMIZATION, THEOREMS, STATISTICAL TESTS

IDENTIFIERS: (U) Block Design, PE61102F, WUAFOSR2304A5

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 417 .13 7/0.13 9/0

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NORTH STAFFORDSHIRE POLYTECHNIC STAFFORD (ENGLAND) DEPT OF MECHANICAL AND COMPUTER-AIDED ENGINEERING

(U) Vibration Control in Rotating Machinery Using Variable Dynamic Stiffness Squeeze-Films. Volume 1.

DESCRIPTIVE NOTE: Annual rept. no. 1 Sep 84-Mar 86,

MAR 86 52P

PERSONAL AUTHORS: Roach M. J. /Goodwin,M. P. ;

CONTRACT NO. AFOSR-84-0368

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-86-1098-VOL-1

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the current status of a research project whose aim is to develop a hydrostatic bearing, for rotating machinery, whose dynamic characteristics may be tuned during operation of the machine. The purpose of this is to enable the operator to exercise some control over machine critical speeds and vibrations. A computer program has been written which will predict both the static and dynamic characteristics of a hydrostatic bearing. The program allows for the presence of accumulators linked to the hydrostatic bearing recessess via flow restrictors. Output from the computer program has been used as input data to a second computer program which calculates machine vibration amplitude variation running speed. Theoretical machine characteristics obtained in this way have been used to aid the design of a test rig which will be used to examine the practical performance of the new bearing type being developed.

DESCRIPTORS: (U) *GAS BEARINGS, *HYDROSTATIC PRESSURE, LUBRICATING FILMS, MACHINES, CONTROL, VIBRATION, COMPUTER PROGRAMMING, MATHEMATICAL PREDICTION, DYNAMIC LOADS, ROTATION, THIN FILMS, LITERATURE SURVEYS

IDENTIFIERS: (U) Squeeze film bearings, Rotating machinery, PE61102F, WUAFOSR2302B1

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 318 .20 12/0

TEXAS UNIV AT AUSTIN ELECTRONICS RESEARCH CENTER

(U) Joint Services Electronics Program.

DESCRIPTIVE NOTE: Final rept. 1 Apr 82-31 Mar 86,

SEP 86 238P

PERSONAL AUTHORS: Powers,Edward J. ;

REPORT NO. TR-33

CONTRACT NO. F49620-82-C-0033

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR
TR-86-0822

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes progress on projects carried out at the Electronics Research Center at The University of Texas at Austin and which were supported by the Joint Services Electronics Program. In the area of Information Electronics progress is reported for projects involving (1) nonlinear detection and estimation, (2) electronic multi-dimensional signal processing, (3) electronics time-variant signal processing, and (4) digital time series analysis with applications to nonlinear wave phenomena.

DESCRIPTORS: (U) *SOLID STATE ELECTRONICS, *QUANTUM ELECTRONICS, NONLINEAR SYSTEMS, SIGNAL PROCESSING, DIGITAL SYSTEMS, INTERFACES, TRANSPORT PROPERTIES, EXCITATION

IDENTIFIERS: (U) Information electronics, Electromagnetics, PE61102F, WUAFOSR2305A9

AD-A174 290 .8 7/0

CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER

(U) Are Mass Extinctions Really Periodic?

DESCRIPTIVE NOTE: Technical rept.,

OCT 86 8P

PERSONAL AUTHORS: Ross,Sheldon M. ;

REPORT NO. ORC-86-19

CONTRACT NO. AFOSR-86-0153

PROJECT NO. 2304

MONITOR: AFOSR
TR-87-0032

UNCLASSIFIED REPORT

ABSTRACT: (U) It is argued that the analysis of family extinction data that resulted in the claim of a 26 Myr periodicity of mass extinctions was flawed in that it did not allow for the possibility of a symmetric random walk model, which is shown to be perfectly consistent with the data. (Author)

DESCRIPTORS: (U) *PALEONTOLOGY, *STATISTICAL ANALYSIS, EXTINCTION, CYCLES, CHI SQUARE TEST

IDENTIFIERS: (U) Random Walk, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ56L

AD-A174 211 .20 5/0

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Infrared-Laser Excitation of the Internal Vibrational Mode of a Diatomic Molecule Adsorbed on a Metal Surface.

DESCRIPTIVE NOTE: Technical rept.,

NOV 86 39P

PERSONAL AUTHORS: Peremans,Andre ;Darville,Jacques ; Gilles,Jean-Marie ;George,Thomas F. ;

REPORT NO. UBUFFALO/DC/86/TR-17

CONTRACT NO. N00014-86-K-0043, F49620-86-C-0009.

MONITOR: AFOSR TR-87-0369

UNCLASSIFIED REPORT

ABSTRACT: (U) The infrared laser excitation of the internal vibrational mode of a diatomic molecule adsorbed on a metal by electron hole excitations. Simple expressions for the populations of the vibrational levels, the mean number of vibrational quanta and the rate of energy transfer between the infrared laser and the metal surface at the steady state are derived. an equation of evolution can readily be solved numerically to determine the time necessary to reach this steady state. The criteria of applicability of the Markov approximation (which leads to the golden rule) is clearly established, where it is seen that this approximation may not be used to compute the evolution of the populations of the vibrational levels. The random phase approximation is shown to give the correct kinetic equation for the populations of the vibrational levels. The excitation of carbon monoxide adsorbed on a copper surface is analyzed quantitatively.

DESCRIPTORS: (U) *LASER PUMPING, *MOLECULAR VIBRATION, *DIATOMIC MOLECULES, MARKOV PROCESSES, ADSORBATES, HOLES(ELECTRON DEFICIENCIES), COPPER, CARBON MONOXIDE, DAMPING, QUANTIZATION

AD-A174 211

AD-A174 100 .3 1/0.14 5/0.20 6/0

ENVIRONMENTAL RESEARCH INST OF MICHIGAN ANN ARBOR

(U) Diffraction-Limited Imaging of Space Objects III.

DESCRIPTIVE NOTE: Final rept. 1 Mar 82-31 Oct 85,

OCT 86 227P

PERSONAL AUTHORS: Fienup,James R. ;Wackerman,Christopher C. ;

REPORT NO. ERIM-161900-20-F

CONTRACT NO. F49620-82-K-0018

MONITOR: AFOSR TR-86-2109

UNCLASSIFIED REPORT

ABSTRACT: (U) This report investigate methods for *obtaining diffraction* limited images of space objects, despite the turbulent atmosphere, by reconstructing images from data provided by optical interferometers (particularly stellar speckle interferometry). Major accomplishments include the following: (1) A new closed form recursive algorithm was invente for reconstructing sampled objects having latent reference points. (2) Improvements in the iterative Fourier transform algorithm were devised, solving the stagnation problems of stripes and of simultaneous twin images. (3) Uniqueness of the reconstructed image was demonstrated empirically. (4) Reconstruction of complex valued objects was shown to to be possible. (5) The Hayes Quatieri recursive algorithm was shown to suffer from a uniqueness problem, and that algorithm was generalized. (6) An improved method for estimating the object's Fouriere modulus from stellar speckle interferometry data was devised.

DESCRIPTORS: (U) *IMAGE PROCESSING, *ASTRONOMY, *DISTORTION, *ATMOSPHERIC REFRACTION, ALGORITHMS, RECURSIVE FUNCTIONS, DIFFRACTION ANALYSIS, SPECULAR REFLECTION, OPTICAL INTERFEROMETERS, TURBULENCE, ATMOSPHERIC MOTION, BOUNDARY VALUE PROBLEMS

IDENTIFIERS: (U) *Speckle interferometry, Hayes Quatieri Algorithm, Uniqueness

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